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The Brief of a Farmer
In a Drainage Proceeding

State of Minnesota
In Supreme Court

October Term, 1919

State ex rel,
P. C. WESTERGARD,
Relator.

vs.

District Court of Stearns County, Minn.
Respondent.

Brief of Appeal from Stearns County
C. R. SANDVIG, Appellant.



TC 97
M 6 925

THE FOLLOWING AFFIDAVIT PROVING THE
UNDERHANDED WORK OF CHRIST BORGER-
DING IN OTHER DITCH CASES WAS OB-
TAINED TOO LATE TO BE PRINTED AMONG
THE OTHER AFFIDAVITS AND QUOTATIONS
AND IS THEREFORE PRINTED HERE.

There was at the time I purchased the farm on which I am now living a county ditch which had been dug about three years before. The total assessments of this ditch against my farm had been about \$760. When a second ditch was laid out that would effect my farm I wanted to object. I asked the cashier of the Scandinavian Bank of Brooten if he had the list of assessments. He said he had, and that my assessments were \$125. Later I saw Christ Borgerding of the North American State Bank, of Belgrade, and told him the cashier of the Scandinavian Bank of Brooten had told me my assessments were \$125. Mr. Borgerding then said, "that is about what it is, \$125." Then he said, "I have the list here, it isn't much—about \$125." He then pretended to look for the list among some papers but pretended he could not find it just then. He then talked quite a while advising me that it would be useless to try to fight the ditch. That the surveyor had figured out the benefits and the viewers would go according to those figures, so it would be useless to try to fight the ditch. When the ditch was dug I found my assessments were \$350 on land in my own name, and \$140 on a 40 that is in my son's name, but I am paying the assessments and am using the land.

FRANK SMITH.

State of Minnesota }
County of Stearns } ss
Village of Belgrade }

Frank Smith appeared before me and after being duly sworn, deposes and says that the above statement is the truth and nothing but the truth.

FRANK SMITH.

Subscribed and sworn to before me, the village clerk, of the village of Belgrade, this the 29th day of July, 1919.

(SEAL)

OLE HENDRICKSON,
Village Clerk.

72-671

It is an established fact, known to be so, and admitted to be true, by all civilized people that the most important spot to any individual in this world is that individual's home.—(Page 5.)

In view 5-D, we have a view of the lakeshore as seen from the bedroom windows during the blooming of the plums and compass cherries in spring time. The view is so taken as to show the window sash on either side. This does not represent the view that I and my family see from the bed room window at all times. A view of the lake is not like a painting. It is changeable; it changes with the seasons; it changes with the shades of light, as for instance with sunrise, mid-noon, sunset, and the various shades of moonlight. (Page 78.)

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THE BRIEF OF A FARMER

In a Drainage Proceeding, Involving the Drainage of
a Beautiful Lake With a Depth of 10 to 30 feet,
Having, However, a Greater Volume of
Muck in its Basin Than Water.

With unerring detective instincts the "farmer" weaves the meshes of "other interests" than agricultural interests about the promoters of this "ditch." With the skill of a born lawyer he traps the members of a clever gang of conspirators in their efforts to "frame up" the evidence and exposes the illegal methods of manipulating the drainage laws for the benefit of "other interests" than agricultural interests. With the comprehensive knowledge of a natural scientist he unveils the all too often unthought of but actual benefits of so-called shallow mud lakes and marshes and puts into his "brief" a veritable encyclopedia of drainage knowledge.

CROSS EXAMINATION OF STATE'S WITNESSES, EVIDENCE AND TESTIMONY BY C. R. SANDVIG—"THE FARMER") BEGINNING ON PAGE 62.

Truth and Justice is the foundation of civilized law. Any law that can not be enacted except with perjury and injustice, is not a civilized law; therefore, is not constitutional in a civilized land. Any attempt to enact any measure based on any law by resorting to perjury and injustice is contrary to law.

General complaints have been made by farmers and farmers' clubs that the working out of the drainage laws has amounted to confiscation of property. In other words, ditches have been forced upon farmers in the name of the drainage laws, where the assessments and other expenses incidental to drainage consumed the entire value of the land against which the assessments were made without bringing the farmers any improved means by which they could meet these assessments. Such ditches have not been legally ordered; either the laws have not been constitutional, or the "evidence" on which these ditches were ordered has been "framed up" contrary to law, justice and good usage.

When, last fall, a fire swept the northern peat bogs and timbered lands, about one thousand human beings being burned alive, investigation was demanded, and investigation has been made. Evidence brought to the attention of this investigation indicated that the fire had smoldered in drained peat bogs; and, further that as a result of drainage there was less dew and less humidity, and doubtless less rain fall. Any or all of which resulted in a drier leaf mulch in the timber—the dry leaf mulch being directly responsible

for the extent of the disaster. This evidence implies that the one thousand victims who were burned alive did not meet a natural death, but were murdered by those who were directly responsible for bringing about this drainage by illegal methods.

The drainage laws have been made to promote and safeguard agricultural interests; where, however, these drainage laws are illegally manipulated by or for "other interests" than agricultural interests they have resulted as above indicated in confiscation of property, arson, and manslaughter.

The estimated cost of Judicial Ditch No. 3, of Stearns and Kandiyohi Counties, has been placed at \$103,000. Compound interest at 8 per cent on \$100,-000 for only twenty years would amount to \$366,000,—interest alone; and, compound interest at 8 per cent for twenty years more would amount to a total of \$2,071,560 in interest alone.

It is a well known fact that Christ Borgerding, a local banker, and his attorney, Mr. Tolman, worked for this drainage project before a single farmer had been found who would sign a drainage petition. It is further known that this banker finally interested farmers in the petition, and obtained signers to the same by the grossest misrepresentations.

To safeguard farmers against being misled by such "interests" as would be benefitted by the very money farmers would have to pay out for a ditch, and the gross though cunning misrepresentation of such "money sharks," the drainage laws have wisely provided that an engineer and viewers shall be appointed to make a professional and disinterested report upon the feasibilities of the drainage project, the cost and damages, and benefits of the same.

When signatures were being obtained on the drainage petition, it was represented that on such a

large project drainage would be cheap, and would not cost more than two or three dollars per acre, and positively not more than four or five dollars per acre. The engineer's and viewers' reports have corrected such gross misrepresentation by showing approximately just what it will cost, which is several times higher than the highest figures named above. One man who was reported to favor the project so long as he knew nothing about the cost, except this banker's modest figures, was reported to have become so enthusiastic as to declare that he would be willing to pay \$500 for the benefits to his farm. That same man had something else to say when he found he would be assessed \$2,000; but, was then given to understand that it would do him no good to say it;—was in fact, warned by this very banker that he might as well go across the sea and try to stop the World War as to try to stop that ditch. It had been asserted that Crow Lake was so shallow you could wade across it with rubber boots. The engineer's report shows that it would take a giant with rubber boots ten to thirty feet high to wade along the route of the ditch.

These incidents will show how wisely the drainage laws have been designed to protect the farmers' interests against unscrupulous "money sharks" who are interested in nothing except the money the farmers would have to raise to pay for the ditch. However, if these "money sharks" can affect an understanding with the judge, or in other words, to use a common phrase—"can fix the judge," then the very provision of the law—to safeguard the farmers—can be so manipulated by the judge in the interests of the "money sharks," as to leave the farmers a hundred-fold worse off than if there were no drainage laws, and the farmers were left to work out their

drainage problems in a neighborly way among themselves. Since the judge has it in his power to appoint the engineer, he can appoint an engineer that will lay out a ditch the cost of which will be of the greatest possible benefit to "the other interests" than agricultural interests; and, can appoint viewers who will report "benefits" in excess of costs regardless of truth and justice, thereby turning the wise and just provisions of the law into a boomerang.

It is a fact known to all who attended the first hearing on Judicial Ditch No. 3 of Stearns and Kandiyohi Counties, that the judge with an understanding smile turned to this banker's attorney; also, nominally attorney for petitionists, and asked him to suggest names of the men he wanted as viewers; and, that the viewers were appointed by the judge in conspiracy with the aforesaid banker's attorney. It is also a fact known to all who are familiar with this case that the judge appointed as engineer a man notorious throughout his county as a confirmed and habitual drunkard, doubtless for the obvious reason that no engineer with a worthy character and clean reputation would so debase himself and his professional standing as to lay out such a ditch as was required by the "other interests" than agricultural interests in this case and report such a project as desirable and feasible.

The drainage laws assume that a drainage project will result in both benefits and damages, and that the project will cost a certain sum of money.

In reviewing the cross-examination of the viewer, Mr. Lahr, by Sandvig, in both the Sandvig case and the Kalland case, it is evident that the viewers have not fulfilled their duty according to oath.

It is an established fact, known to be so, and admitted to be true, by all civilized people that

the most important spot to any individual in this world is that individual's home.

If a slaughter house, or a noisy, smoky factory, is about to be located in some part of a large city, however desirable the institution may be as an addition to the city from an industrial or money standpoint, if objections arise from the HOMES of the city against the noise and smoke of a factory, or the bellowing of bulls, and the stench of blood of a slaughter house, million-dollar industries have had to go a-begging for a spot on which to locate, because they were objectionable to the HOMES of people who dwell in cities.

A beautiful and valuable lake is about to be drained. The viewers have given no more or even as much consideration to how the drainage of this lake will adversely affect the beauty and health of the homes of the farmers affected than if these farmers and their families were mere animals. In the case of Mr. Sandvig's home, Mr. Lahr does not even admit having any knowledge as to whether there is or is not on that property a home on the lake shore. The same as to Kalland's home, (with reference to the ditch). The same as to Kittleson's home. Posed for a photograph taken by petitioners, but for obvious reasons not presented by them, but the identical same photograph obtained and presented by Mr. Sandvig, taken about forty rods south of Pierce's buildings; Mr. Lahr is forced to admit the knowledge of "some buildings" on that place; "some buildings," just "some buildings." That is the way this witness of the state designates the home of a farmer. "Some buildings"—a pig shed, a horse barn, a cow stable, a chicken coop; just "some buildings." The viewers do not go up to those buildings to investigate whether there may not be among those buildings, or whether those buildings as a whole, do not comprise the ordi-

nary farm factory for converting the raw material of the farm into the finished commercial products of butter-fat, beef and pork, and eggs and poultry, etc., etc.; and whether there is not among those buildings the home of a human family—the most important spot in the world to that family. The viewers do not investigate whether that home and farm factory may not be adversely affected by the draining of the lake that is a part of these farmers' homes.

In the state-wide scheme for manipulating the drainage laws for the benefit of "other interests" than agricultural interests, the Supreme Court has ruled that the testimony of viewers is *prima facie* evidence, thereby, not only making the wise and just provisions of the drainage laws which provide that "interested property owners shall be heard as to objections, testimony and arguments," of non-effect, but converts that wise and just provision of the law into a boomerang, which still further increases the benefit of a drainage project to "other interests" than agricultural interests; and, increases the burden and injustice of the drainage project as it affects the farmer. The ruling of the Supreme Court that the testimony, or evidence, of the viewers is *prima facie* evidence, makes it possible for a "fixed judge" to frame up his ruling on the testimony and evidence of these members of a gang of conspirators. These hirelings, appointed in a conspiracy, between a "fixed judge" and the regular attorney of the very banker who is the promoter of the ditch, for the benefit of "other interests" than agricultural interests. So long as the testimony of the viewers is *prima facie* evidence, the judge may "find" that there is no such a thing as a home, the abiding place of a human family, and the most important spot in the world to that family, where the viewers testify that they did not

see and have no knowledge of the home—the testimony of the viewers is *prima facie* evidence. The farmer who lives in that home, to whom that home is the most important spot in the world, and who alone can say how great will be the damages to that home by the drainage of a lake, that is one of its chief attractions, may hire lawyers, and lawyers are one of the “other interests” than agricultural interests that profit by drainage projects. The lawyers may put the farmers on the witness stand, and make the hearing lengthy, and expensive—an expense which like a boomerang is finally forced back upon the farmers. After days of mental strain, expense, and absence from the management and work of the farm, the farmer hears the lawyers literally give him the “horse laugh,” as the lawyers remind the court that “the Supreme Court has ruled that the testimony and evidence of the viewers is *prima facie* evidence;” that the testimony of these state’s witnesses is the testimony of disinterested experts, while the testimony and evidence of the farmers is partial and biased, and unreliable, because the property owners are INTERESTED. Either this kind of viewing by viewers supposed to represent the state, but who, in fact, represent only the interests of “other interests” than agricultural interests will have to be corrected by law, by making the very letter of the law effective, by appointing only viewers who are disinterested parties and requiring these viewers to do their full duty, and not merely to frame up benefits in excess of the estimated cost of a ditch, regardless of truth and justice; or, the day may come when this kind of viewing and this method of “framing up” evidence may be corrected by horse-whipping, a coat of tar-and-feathers, or lynching; if farmers, persecuted and insulted beyond endurance, shall ever bethink them-

selves to employ in defense of their living and their homes the very methods inaugurated by the political gang in office against certain farmers' and laborers' candidates, or men representing these farmers' and laborers' candidates, in the pre-election activities of 1918 in Minnesota.

Farmers can not be expected to submit forever to the insult of having state witnesses testify that they do not even know as the farmer has any home on the lake shore; and, then when the farmer who lives in that home, and to whom that home is the most important spot in the world testifies and presents evidence that he does have a home on the lake shore and that money can not pay the damages to that home by the draining of the lake—one of its principal attractions—only to have the lawyers remind the judge that the testimony of the viewers is *prima facie* evidence, and the testimony of the farmer is partial, biased and unreliable, because HE is INTERESTED.

The viewer, Mr. Lahr, testifies that he is an old acquaintance of Christ Borgerding, the banker—an acquaintance of the kind who is always treated to a cigar when they meet. Mr. Lahr, also testifies that he was in nightly consultation—or what could amount to the same—with Christ Borgerding while performing the duties of a viewer. Mr. Lahr does not deny that Christ Borgerding discussed the ditch with him more than any other individual. Mr. Lahr admits that Christ Borgerding is interested in drainage in a general way. It is not claimed that Christ Borgerding has any land that would be affected, so he can not be directly interested. It is charged that Christ Borgerding is interested in a general way—as a banker. And as a banker might profit to the extent of over \$2,000,000 in com-

pound interest in forty years on the cost of the ditch, should all farmers borrow all money from him to pay all assessments on 8 per cent notes and continue to pay interest and compound interest for forty years. As Borgerding had the only bank in Belgrade at the time definite activity was launched by him and his attorney on this drainage project, the above assumed probability may not be over-drawn.

There can be no just and lawful administration of the drainage laws so long as "other interests" than agricultural interests are permitted to influence the court, lawyers, viewers and the engineers in a drainage proceeding.

It is well known that Banker Borgerding invited one farmer who would be adversely affected by floodwater at the lower end of the ditch, into his office and proposed a settlement—suggesting one hundred dollars, one hundred fifty dollars, or maybe two hundred dollars—as damages; arguing that it would be better to take a couple of hundred dollars that was offered, rather than leaving it to the uncertainty of making a settlement later. When this farmer refused, Banker Borgerding suggested that he come in again when the viewers came around, as he knew the parties well, and they would talk the matter over with them.

The following is a signed statement from another farmer:

"Christ Borgerding assured me that he would talk the matter over with the surveyors and see to it that I get damages for land flooded by the proposed Judicial Ditch No. 3."

(Signed) AUGUST SONSTERGARD.

It is, also, generally known that certain farmers complaining to Banker Borgerding that the ditch was so laid out as to cut off a corner of their land,

were assured by this Banker Borgerding that HE would see to it that the course of the ditch would be so changed as to be on the lines.

The drainage laws have provided that a ditch shall be laid out by an engineer for the very wise provision that an engineer shall by his professional knowledge cut across corners whenever the saving in the construction of the ditch by so doing will exceed the reasonable damages that may be paid for the corner so cut off.

It is public knowledge that this Banker Borgerding appeared in the Court House in St. Cloud, December 27, 1917, being the time set for the final hearing on Judicial Ditch No. 3, of Stearns and Kandiyohi Counties, and did personally make overtures to two of the objectors at lower end of ditch, in which he tried to obtain their agreement to withdraw their objections, if the ditch were stopped before coming to their properties, and thus eliminating their assessments. No changes in the course and length of the ditch could legally have been made at this time, except by the Court. Christ Borgerding's conduct assumed that any arrangement made by, or with him, would be carried out by the Court; indicating that there must have been an understanding between himself and the Court.

The plan of the ditch to drain Crow Lake bears on the face of it the evidenec that it was made for "other interests" than agricultural interests, and without any consideration whatsoever for agricultural interests. A ditch only four feet wide at the bottom, seventeen and one half feet deep, and perfectly level for three miles, would not drain to its bottom, though concrete retaining walls were provided to hold back the muck and soils. The water would back up. Slime, moss and drift mud would form in

its bottom. It would not with concrete retaining walls be effective to its bottom throughout its level length. Without concrete retaining walls any kind of soil would cave in, and make the ditch uneffective to its lowest depth throughout its level length.

Sandvig's testimony on cross-examination shows by quoting actual proofs in every instance just what would happen in muck. "Muck lends itself very readily to being moved with water." To obtain a constant supply of muck in irrigation water sucked from lake bottom, it is necessary to loosen up the muck since the muck weighing only eight ounces per gallon more than water, does not readily cave or flow to the pipe so long as supported by the weight of the water. However, if a shovelful of muck is lifted to the surface it instantly spreads out by its own weight like soft pancake batter. This is just what would happen in the ditch. The ditch draining off the water—left with no water to support its weight, the muck would flatten right out into the ditch. The effect of draining out the water of the lake and leaving the muck to settle a year before digging through the muck of the lake is explained with proof by Sandvig. A scraperful of muck dumped on top of the dry ground in the driest season ever known, with the dry ground exerting a tendency to absorb moisture from underneath, in an exceptionally dry season with little or no rain to keep it moist, in the form of a small mound which would readily shed any rain that might fall, a small quantity—only a scraperful, exposed to the drying effect of sun and wind. Yet the following year there was water enough in this muck beneath the immediate surface so that water could actually be squeezed out of it. The muck of Crow Lake left in the lake basin, undisturbed for a year, supported by the underground water, and receiving

on its surface normal rain and snow water, and the water flowing in upon its surface from the Crow Lake water shed, would not even on its surface be dried out as much as a single scraperful of muck dumped on top of the dry ground. The muck would flatten out into the ditch.

State's witness, Engineer Bradly, testified on cross examination by Sandvig that some plants draw sustenance from air and water.

State's witness, Engineer Chute, on cross examination by Sandvig, testified that he had seen evidence of slough grass sod, creeping out into the lake in some places. Further testified that this slough grass sod, when once covering the lake would aid materially in holding the muck together, so that it would not run out like soup; and, further testified that a lake may so grow together as to dry up without drainage; and, further testified that it would take several centuries before Crow Lake would be so covered with slough grass sod to hold the muck together as to make drainage really feasible. This drainage project is, therefore, according to Engineer Chute's own testimony, premature by several centuries. The plan to dig a ditch through Crow Lake seventeen and one-half feet deep at the outlet, and level for three miles with a bottom four feet wide, is therefore, a plan pre-eminently to dig such a ditch for the benefit of such interests as would be benefitted by the very money the farmers would be required to pay for said ditch, and not for the benefit of the farmers. That such a ditch under such conditions would drain Crow Lake dry, and make of its bed good agricultural land may be testified to by an engineer and viewers who have committed themselves to "framing up" evidence by which this ditch can be "legally ordered," but the

whole plan is contrary to well known engineering and agricultural knowledge. The evidence of Mr. Sandvig leaves nothing of the "feasibility" of such a plan. The evidence of Mr. Sandvig is the evidence of a natural scientist of no mean standing—it is more, it is the evidence of a natural scientist who has devoted a dozen years of constructive research in experimenting with muck of Crow Lake, who gives evidence and answers every question by quoting an actual test, experiment or proof, bearing directly upon evidence given; and, whose constructive research has blazed the trail of a "better way" for utilizing muck lakes for agricultural purposes than by draining. Testimony with exhibits on the latter subject is given in Sandvig's evidence, and the judges are referred to the same. However, for strategical reasons this subject will not be given further treatment here.

It is a well known fact that some lakes if thoroughly and effectively drained do instantly produce good crops, while other lakes, though thoroughly and effectively drained, do not produce crops worth the cost of cultivating, and therefore, though drained are worthless. The following statement on this subject, is now general knowledge, by Dr. Allway, Chief of Division of Soils, University of Minnesota, and therefore, nominally the highest authority on the subject in the state, made in reply to questions at the Minnesota State Horticultural Convention, and published in the Horticulturalist for June 1916, reads as follows * * * * :

The next question is—"Are the black peat or muck soils first class? Do they need anything besides drainage?" Some of them, a very few, produce really good crops when they are drained, plowed and brought under ordinary cultivation without fertilization, but only a few. Nearly all of them need commercial fertilizer, and

until a bog covered with peat soil has been carefully examined to ascertain the depth of the peat, the difficulty of drainage, and the character of the peat (because peats differ greatly within a few miles of each other) it is unwise to attempt to reclaim it. Within three miles of the experiment station we have three bogs very different in character. One, about half a mile from the buildings, is heavily charged with lime. Another has an exceedingly small quantity of lime so that profitable crop production of any kind would be out of the question without a heavy application of ground limestone or quicklime. Still another one stands between these two. One of them can be reclaimed without any great expense, but with the one it would be a very expensive matter to fertilize and treat with lime after it had been drained.

Practically all peats are lacking in potash. If the peat layer be very shallow, six inches, twelve inches, sometimes even twenty-four inches, the plants are able to get their roots down through the peat and get their potash from the underlying clay or loam. In that case no fertilizer is needed. Some of the peats lack lime, some of them lack lime, potash and phosphoric acid, and some these three and nitrogen also.

The mere testimony of a civil engineer and ditch viewers that a lake bed will be worth any given sum per acre after a specified ditch has been dug is not *prima facie* evidence. In view of the fact that it is general knowledge that some lake beds, though drained, do not produce crops sufficient to pay actual expense of working them, and are therefore a liability to the farmers upon whom they have been forced by illegal manipulation of the drainage laws. Any price whatsoever can not legally be placed on any undrained peat or muck land until that peat or muck has been proved by farm tests to have a value in that it produces crops of greater value than the costs of working the land; or, at least by making soil analysis by a soil expert of the composition of the soil or muck to be drained, and computing by an impartial soil

expert that such soil and muck does, according to soil tests, contain the elements requisite for profitable farming.

State's witness, Engineer Bradly, testified on cross-examination by Sandvig that the muck of Crow Lake had not been analyzed by any soil expert. It is not, therefore, proved by any evidence that the bed of Crow Lake would have any value whatsoever, even if the impossible ditch should drain it dry, which it will not.

I submit to the Supreme Court that the proceedings in the case of Judicial Ditch No. 3, of Stearns and Kandiyohi Counties, have been performed by the Court, the engineers and the viewers contrary to law. The finding of the said Court under these conditions is therefore contrary to law, and must be reversed as far as it applies to Crow Lake. The petitioners, through the State's witness, Henry Hendrickson, claim that seepage from Crow Lake affects the lands of Henry Hendrickson, about three miles below the lake, and Sandvig has given evidence that for similar reasons the big ditch would lower the underground water. The lake being maintained by the seepage into the lake by this underground water, on account of the underground water, standing higher in the gravelly hills, around a goodly portion of the lake, than the lake level.

Sandvig also has given evidence that the digging of ditches or deepening of ditches has lowered and does lower the underground water. It would be vain to stop the ditch from draining Crow Lake by running through the lake and still have the lake drained by digging a deep ditch at Henry Hendrickson's, or at any other point, on the main ditch or laterals comprising Judicial Ditch No. 3, which would so lower the underground water as to cause the water of Crow

Lake to dry up, leaving only a soupy muck, which with the water removed would be an eyesore and a menace to health. It is, therefore, in evidence that in order that the reversing of the ruling as to draining Crow Lake shall be made effective. The ruling as to digging any portion of Judicial Ditch No. 3, of Stearns and Kandiyohi Counties, must be reversed; and, it is demanded that the entire ruling be reversed.

Another point too important to be overlooked is the fact that at the time of the final hearing on Judicial Ditch No. 3, of Stearns and Kandiyohi Counties, and also at the time the ruling was made to order said ditch, the United States was engaged in a World War in which food and farmers were as important, if not more so, than ammunition and soldiers. "Food will win the War" was made a National Slogan, as well as various slogans to "Buy Liberty Bonds" and "War Savings Stamps." These proceedings, by illegal methods tended to taking the farmers away from their world-important task of producing bread to win the war. In the opening sentences of the order ordering the said Judicial Ditch No. 3, the Court makes these statements: "The above entitled matter was originally set by order of this Court for December 27, 1917, at ten A. M., at the Court room in the Court house in the city of St. Cloud in Stearns County, Minnesota; and, was on said day on account of the absence of the undersigned before whom the matter was pending, continued to December 28, at which time it was again continued on account of the December General Term of this Court in said Stearns County to the 19th day of February, 1918."

This last statement is incorrect. The following is the fact of the matter: When the case was called on December 28, Attorney Sullivan of St. Cloud had

just been retained on the side of the petitioners. Mr. Sullivan had not previously been connected with the case, and it would seem apparent that a new lawyer taking charge of a case would want some time for preparation. Attorney Tolman for petitioners made a plea for postponement of the case on the ground that they were not aware of a considerable force of objectors. A continuation could not be made on this plea since there was in evidence that while only twelve signers had signed the drainage petition, objectors had appeared with attorney, at first hearing, and presented petition protesting against the drainage of Crow Lake signed by SEVENTY-FIVE signers. Attorney Sullivan then made the plea that they simply could not proceed with the hearing on account of the absence of Engineer Chute, stating that Engineer Chute was in a sanitarium and could not be brought to Court. Engineer Chute had been seen by some of the objectors on the streets of St. Cloud the evening before. If he were in a sanitarium, he had been spirited away in the night. If there were any reason for his being in the sanitarium, it was doubtless alcoholism. The Court continued the case to February 19 because of the absence of Mr. Chute in a sanitarium. Had the Court, in the first place, appointed a man, not notoriously a confirmed and habitual drunkard as engineer, this excuse for continuing the case after it had been properly called, might not have been found. The Court in calling the case, and thus continuing it, because of the absence of the engineer the Court had appointed, in a sanitarium, was trifling away the time of the farmers in a world war where the work of farmers to produce food to keep alive the armies of the Allies was as important as the work of the soldiers in killing off the enemies.

Further, in continuing the case for ten days

where thirty minutes would doubtless have been sufficient to have heard the report of the engineers and dismissed the whole case, had the engineers and viewers brought in a true and impartial report of the actual fact that the ditch was neither desirable nor feasible, instead of trying to put the ditch through for the benefit of "other interests" than agricultural interests—the Court also being in the conspiracy to put the ditch through, further unnecessarily and illegally trifling away the time of the farmers, whose interests kept them at the Court proceedings from day to day.

Further, in ordering the ditch, and thereby placing a burden of about \$103,000 upon the affected farmers, the Court made it particularly difficult for these farmers to buy Liberty Bonds.

Further, had this ditch been dug, the actual fact being that the added land would, aside from the assessments, be a liability to the farmers to whom it would be assessed, or to whose farms it would be added. This would still further cripple these farmers in their patriotic efforts to produce "food to win the war."

As it is known that the enemy resorted to many kinds of diabolical tricks, it does not seem improbable that the enemy may not actually have been behind the whole scheme of trifling away valuable time of farmers in bringing about this abominable litigation and Court proceedings, and in ordering the ditch, the cost of which would consume the money that was needed for Liberty Bonds, and the effect of which would be to burden the farmers with nonproductive land, that would consume their time, but not produce crops according to labor required.

The illegal manipulation of the drainage laws for

"other interests" than agricultural interests; in time of war, may therefore, be summed up in resulting in the confiscation of property, arson, man-slaughter and treason.

The photographic exhibits presented by the state's witness, engineer Chute, are proof of a deliberate and well-planned effort to misrepresent the lake as it was at the time. However, the very vegetable growth shown in these photographs taken in the shallowest ends and bays of the lake, is proof that Crow Lake is a lake and not a marsh, as this vegetable growth is plainly the wild rice of Minnesota. Wild rice as is well known is a cereal plant that grows only in lakes and not in marshes. Wild rice is, moreover, a valuable food. The Indians gathered it for food. We do not today know that we are in all respects wiser than the Indians. The Indians killed just so many buffaloes as they needed for meat and robes. The white man murdered the buffaloes in cold blood for no other purpose than to kill. Had we adopted the Indians' prudent methods, we would have had buffalo meat and buffalo robes for the shooting today. Had we invented machinery to harvest wild rice instead of inventing machinery to dig ditches, we might today find wild rice culture more profitable acre for acre than flax, corn, oats, barley or wheat. Moreover, we should not then have had the hot winds, even as we did not have the hot winds before excessive drainage.

We have had proofs in recent years that there may be coal shortage that will cause panics. Local supplies of fuel from natural timber is fast being exhausted, and has been exhausted in many localities by grubbing up the timber land, and converting it into farm land, by killing off the timber by pasturing, and by the invasion of the army worm, and by

drouth and fires as direct result of drainage. In some of the older countries of Europe and Asia they are using straw for domestic fuel. We may be approaching a period when we may not even have straw. The infesting of fields with quack grass is convincing many farmers that only cultivated crops and hay may be raised in the future.

The water power resources of the state—not yet half developed, is an asset the value of which we do not comprehend. Scientists who have given the subject serious thought, will not hesitate to declare that the lakes, so essential in storing the flood water, and feeding it out in a constant flow for the turbines, will be worth more acre for acre than arable land in maintaining a constant supply of light, heat and power.

Cranberry farming is now a proved success and has demonstrated that marshes developed for cranberry farming produce acre for acre crops worth several times more than the ordinary crops raised on drained and dry land.

Fur farming is one of the most promising of new industries. The total value of the musk rat skins, and musk rat carcasses, (for human food or for chicken food), that could be produced in a lake like Crow Lake, if musk rat farming were placed under scientific management, might easily exceed the value of any or all farm crops that could be raised. If after years of digging and re-digging the muck could be made firm by digging and re-digging a ditch thirty feet deep, and this muck soil at unknown expense should be developed into good farm soil by the application of sand and fertilizer.

The economic value of the toads and frogs that hatch in a lake like Crow Lake is beyond comprehension. With flax quoted at \$4.50 per bushel, as

this is written, many farmers have had to disk up their flax to plant corn fodder, and have had to re-plant earlier plantings of corn, on account of cut-worms destroying the stands. We need, not less shallow lakes, but more shallow lakes; and, the real old fashioned marshes, to breed enough toads and frogs to keep the cut worms in check. Cut worms are the natural food of frogs and toads as is now well known to agricultural investigators. It is evident that our legislators, not being natural scientists, did not know—did not comprehend—the disappointments and actual damages that may result from drainage ditches. That however, is no reason why the law—the drainage laws, in all their shortcomings and weaknesses, should be criminally manipulated for the sole benefit of “other interests” than agricultural interests.

I submit the following quotation with or without comment as evidence of general knowledge, or as arguments.

IMPORTANT DRAINAGE FACTS

(Pamphlet by C. R. Sandvig)

It is now known that several months before Henry Hendrickson appeared with the now notorious drainage petition to drain Crow Lake, another drainage petition to drain Crow Lake had been prepared without the consent of a single farmer.

It is now further known that Christ Borgerding drove out into the country and asked interested farmers to take up a drainage petition to drain Crow Lake and that a well-known associate of his in his banking business urged other interested farmers to take up “a drainage petition to drain Crow Lake.”

It is now known and can be proved by numerous witnesses that at a drainage meeting held in Bel-

grade several months before Henry Hendrickson appeared with the now notorious drainage petition to drain Crow Lake the overwhelming majority of the people present being opposed to the proposed drainage proposition one man got up and demanded to know who had called the meeting, to which a straight-forward honest, farmer made the reply that Christ Borgerding and Attorney Tolman had come out to his place and asked him to call a drainage meeting and so he called the meeting. Attorney Tolman being present at the meeting and taking part in the meeting by talking for the proposed drainage scheme without being called upon to do so, it was demanded of him what business he, a Paynesville attorney, had at that meeting, to which Attorney Tolman replied that he had been hired to be present by Christ Borgerding and was there as Borgerding's representative.

It is now a well known fact that after Henry Hendrickson had been around with the now notorious Crow Lake drainage petition for a few days, the petition was left at the North American State Bank according to previous agreement and Christ Borgerding not only took signers to the petition as an accommodation to the public but that he induced signers to sign by outrageous misrepresentations and deliberate lying.

In inducing a poor, old bachelor, in failing health who soon may become a public charge if fleeced out of the little property he has left, to sign the petition, Christ Borgerding represented to him that the ditch would greatly benefit his land (about 10 acres of low land) and would only cost a few cents, perhaps two or three dollars. That poor sickly old bachelor has been assessed over \$300 benefits, with a reasonable probability that the ditch will cost at

the first digging about as much as the assessed benefits and by redigging in a few years cost more than the assessed land of the poor bachelor is worth.

Christ Borgerding assured a poor widow and orphan who are making a heroic effort to improve and work the old farm that they surely would not be assessed more than about \$120 and that the benefits would be very great. That farm has been assessed \$1,400 benefits with reasonable prospects that digging and redredging the ditch will in a few years mount up to more than the exaggerated assessed "benefits." Let it be understood that the law provides that the first cost may be as high as the assessed benefits but redredging may bring the cost up to any unheard of figure.

Christ Borgerding assured a farmer that a "south forty" being referred to in their conversation would not be assessed at all. The same south forty has been assessed \$1000. Since the assessments were made Christ Borgerding told one farmer, who cannot read the American language, that his assessments were \$1100, That farmer's assessments are over \$1900. Christ Borgerding has assured others that the cost will not be more than about 40 per cent of the assessed benefits. The facts are that even the engineer's estimate places the cost at over 50 per cent of the assessed benefits with several important items of expense provided by law, left out, and under war time conditions it is more than reasonable to assume that the actual cost will far exceed any estimated cost based more or less on present conditions or on conditions before the war, while the redredging of a ditch once dug may bring the cost up to any figure.

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All water that is evaporated and ascends into the clouds, of course does not come from

the ocean, as every fresh as well as salt body of water contributes to that continual ascent and descent which nourishes the earth and the fulness thereof. It has been computed by some patient calculator that 200,000 cubic miles of water are raised each year from the ocean, in the form of vapor. At least three-fourths of this immense volume is raised within the tropics, and a great part falls beyond them. If the extent of the tropical ocean were diminished by half, there is no part, perhaps, of the temperate zones which would not be parched by excessive drought, and hardly a river but whose bed would be a dry ravine.

The water which fills the great lakes of North America and, thundering down the cataract of Niagara, finds its way through the St. Lawrence River into the ocean almost on the verge of the Polar World, only a few weeks before, perhaps, laved the coral reefs of the tropical seas.

If any considerable part of the tropical ocean were converted into land, the heat of the Torrid Zone would become so greatly increased that no animal life, such as now exists, could endure it; and, as the vegetation of a climate is adapted to the prevailing temperature, the trees and plants which now flourish would become extinct. Water, in being converted into a gaseous form by the process of evaporation, absorbs heat from surrounding objects, or, we may say, produces cold. Thus the burning rays of a vertical sun, pouring down upon the ocean, in a measure quench themselves. The same rays which, falling upon the ocean, never raise the water beyond a grateful temperature, falling upon the land produce an intolerable heat.—*The World's Wonders.*

While the oceans supply all the water that falling in rains produces all the mighty rivers that flow back into the sea: "From whence the rivers come, thither they return again." Eccleseastes 1:7. Still, but for the influence of inland lakes upon the atmosphere, the atmosphere would not by natural laws be able to release this water, or produce rains.

GROWING CRANBERRIES ON A LARGE SCALE

CRANBERRY GROWING IN NORTHERN WISCONSIN A HIGHLY SPECIALIZED INDUSTRY—REMARKABLE DEVELOPMENT IN TEN YEARS DUE LARGELY TO THE EFFORTS OF ONE MAN.

(By Lewis R. Jones, in *The Farmer*.)

A certain prosperous resident of Wood County, Wisconsin, a dozen years ago was regarded as one of the county's poorest farmers. He had struggled many years, attempting to grow farm crops on a heavy, marshy piece of land which seemed to get worse the more it was tilled. At last mortgages and other debts weighed so heavily that some change seemed imperative.

The change this farmer made caused his neighbors to shake their heads and say he was "going crazy." Instead of trying longer to grow corn and small grain he decided to cultivate a bog which occupied a part of his farm and which always had been looked upon as worthless except for a volunteer crop of cranberries which in favorable seasons was large enough to be worth gathering.

SUCCESS OUT OF FAILURE

This hitherto unsuccessful farmer went ahead in the face of advice and ridicule, spent all the money he could get together and developed as much of his bog as that money would permit.

Later he extended cranberry cultivation to the whole of the marsh. He has proven his theory to be practical and successful. In 1915 he grew 26 acres of cranberries with a net profit of more than \$20,000 on this farm which in earlier years did not yield him a living. He has spent 11 years growing cranberries, and ever since his marsh began bearing he has obtained large profits.

After this farmer had demonstrated that growing cranberries scientifically was more profitable than general farming those same neighbors who had laughed at his idea began also to grow cranberries, and they, too, succeeded. The idea spread over the state. Hundreds

of cranberry marshes were improved, and today the area of cranberries under scientific development is many thousands of acres.

There are two essentials for a clean-culture cranberry plantation—a sour marsh and sufficient water for flooding it. By submerging the vines on cold nights of spring and fall the damage from frost is escaped.

YIELDS UP TO 250 BARRELS

Three seasons are required to bring the plants to bearing. At the end of the third season a yield of 25 barrels to the acre may be expected. The next year the crop will be about 60 barrels and the fifth season should produce a crop of 100 barrels to the acre. After that there should be a gradual increase until an acre frequently will produce as much as 250 barrels in a single season. Meanwhile the only attention required is occasional weeding, flooding and harvesting, and thinning out the vines when they become too thick. The vines thinned out are used for planting new beds.

At harvest time the beds are flooded, and the berries, being lighter than water, come to the surface where they are stripped from the vines with especially designed scoops. These are so constructed as to gather the berries with very little foreign matter and without damaging the vines to any serious extent.

And God saw everything that he had made, and, behold, it was very good." Gen. 1:31.

We have seen that lakes have their beneficent purpose in the plans of nature. If, however, a lake has by erosion of the highlands being washed into the lake and the same collected and deposited by vegetable growth in the lake, so filled in the lake as to leave it only a "sour marsh," it may still as a "sour marsh" be of greater value to man for cranberry culture than if the plan of nature is completely changed by draining it, in which case, as farm land it is often worse than worthless. It has also been demonstrated that a lake partly filled with muck by the same agencies may be of the greatest possible value to man when the accumulated muck is

pumped back upon the highlands from whence it has been washed by erosion, restoring to its full extent the beauty and usefulness of the lake and the fertility of the high land. God has made no mistakes. We cannot improve the world by making it over—destroying the plans of the Creator, that "other interests," etc., may be benefited. It is our duty not to make the earth over, but to "SUBDUE IT." Pump the muck back on the high land that the lakes may perform their functions unhampered and that the earth may yield its full capacity. Meanwhile we may grow wild rice, musk rats, wild fowl and fish, and the lake that has become a "sour marsh" may still for cranberry culture be worth more than if the plan of nature is changed and it be attempted to raise dry land crops where water ought to be. Harness the water power to turbines—SUBDUE THE EARTH—it is the Divine command. As the waters flow steadily down to the sea "from whence the rivers come" let us take our toll of "Light, Heat and Power." We cannot tame a wild and frisky colt into a docile, useful horse by cutting his legs off. Neither can we exact our toll of light, heat and power from the river or manna from our fields when the lakes—the legs of nature—are cut out.

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United States Department of Agriculture,
Office of Public Roads and Rural Engineering,
Washington, D. C.

December 6, 1916. 4:30 p. m.

Mr. C. R. Sandvig,
Belgrade, Minnesota.

Dear Sir: Since the success of a drainage district is determined to a large extent by the co-operation of the landowners, it seems hard to conceive that any court would approve or direct the establishment of a drainage district of lands where but twelve persons favor it and seventy-

five persons are opposed to drainage, and if you can establish this fact before the court, I do not believe it will establish a district. As the matter of drainage is a State question, I do not see any way in which the Federal Government could interfere.

All of the drainage laws of Minnesota provide "that no meandered lake shall be drained * * * except in case such lake is normally shallow and grassy and of a marshy character, or in case such meandered lake is no longer of sufficient depth and volume to be capable of any beneficial public use of substantial character for fishing, boating, or public water supply." If the lake you have in mind falls under these exceptions it would seem that the petitioners for the drainage of this lake must fail.

Your opinion with respect to the effect of lakes on hot winds has been noted, and we have seen similar expressions by others, but as far as we know there are no Government publications on this subject. Since Dean Woods of the Minnesota College of Agriculture was formerly connected with the Weather Bureau it may be that the observations in the Imperial Valley to which he referred were made by that Bureau, and your letter is being referred to the Chief of that Bureau with the request that he give you any information that he may have on the subject.

Very truly yours,
L. W. PAJE, Director.

Salton Sink, Emperial Valley, California, was a depression 300 feet lower than sea level. As a result of high water cutting out an irrigation canal the entire volume of water of the Colorado river left its old channel and flowed into Salton Sink forming the new formed "Salton Sea."

Salton Sea has proved one of the most valuable contributions to natural science in that it gave to man an opportunity to observe the effect of a body of water suddenly formed in a desert region where no lakes had existed for unknown centuries. All lakes having been cut out—drained—by river erosion in prehistoric times.

SALTON SEA AND THE RAINFALL OF THE SOUTHWEST

(By Prof. Alfred J. Henry, Dated Jan. 25, 1907.)

Printed and sent out as an official document of the United States Weather Bureau.

There is a growing belief in the extreme Southwest, and possibly in other parts of the country, that the creation of Salton Sea is, in large part, responsible for the heavy rains of the last two years, not only in Arizona, but also in the Rocky Mountain States, and thence eastward over the plains. So strong is this belief that some persons have gone so far as to publicly advocate the maintenance of the present Salton Sea, notwithstanding the efforts now being put forth to shut off its supply.

It is generally believed that small bodies of water have an appreciable influence on the local climate of contiguous land areas.

The effect of a small body of water such as the Salton Sea on the climate of the surrounding territory may be recognized in two principal ways, first, in its equalizing effect on the temperature, and second, in the increased amount of water vapor thrown into the air by evaporation, since more water is evaporated from a water surface than from forests or fields. Owing to the fact that a water surface warms up much more slowly than a land surface and retains its heat much longer, the water surface will, in general, be warmer at night than the land, and cooler in the daytime. Thus there will be a tendency toward lower maximum temperatures and higher minimum temperatures in a narrow zone immediately surrounding the lake, but especially on the leeward shore.

The amount of aqueous vapor actually present in the air may be expressed either by the expansive force or pressure that it exerts or by its weight in grains in a cubic foot of space. Whether expressed in terms of weight or pressure, the amount of vapor actually present is sometimes called the absolute humidity. It is very important to distinguish between the absolute humidity and the relative humidity, sometimes referred to merely as the humidity. The relative humidity is the ratio of the amount of vapor actually present to that which might be present at the existing temperature if fully

saturated: Example from Death Valley, June, 1891, temperature of dry bulb, 108 degrees F., wet bulb, 68 degrees F., whence is obtained from hygrometric tables: dew-point, 39 degrees F., relative humidity, 10 per cent. A relative humidity of 10 per cent or less is not at all infrequent in desert regions. The observation quoted means, first, that in order to condense any of the moisture present into dew or rain the temperature would have to fall 69 degrees (from 108 degrees to 39 degrees F.), or the amount of moisture then in the air would have to be increased ten fold. This point can not be emphasized too strongly. At the temperatures which exist in the Colorado Desert, and under the general conditions of aridity which prevail, the atmosphere takes up vapor as a sponge absorbs water. It should be remembered, moreover, that the capacity of the air for vapor is vastly greater at high than at low temperatures; the problem in the Southwest, therefore, so far as the production of rain is concerned, is not essentially one of increasing the vapor contents of the air but rather of diminishing the temperature to the point at which condensation takes place. There is sufficient moisture in the air to produce abundant precipitation if means of cooling it were at hand. The absolute humidity at Yuma is slightly greater than that of St. Louis, and only a little less than that of Vicksburg, both of which points have, in general, an abundance of rain and a so-called moist atmosphere.

The amount of vapor taken into the air over Salton Sea must be considerable in the course of a year. That it has increased the relative humidity in a slight measure, is undoubtedly true. Aqueous vapor in the absence of a strong wind circulation is diffused very slowly throughout the atmosphere. It is, therefore, improbable that any considerable portion of the local supply of vapor ever passes beyond the immediate confines of the desert.

Atmosphere that is dry as the "desert winds" is dry only because it is hot. If sufficiently cooled its water contents is capable of letting down torrents of rains sufficient to create mighty rivers. Preserving or creating bodies of water such as lakes.

Artificial dams or reservoirs, is the only means of cooling the atmosphere that may be brought about by human agencies. As the hot atmosphere takes up vapor as a sponge, from these bodies of water, the atmosphere while being cooled by a body of water is at the same time impregnated with humidity, the greater the humidity the less cooling will be required to produce rain. The ocean furnishes the bulk of the water to the atmosphere. But for the effects of inland lakes, the atmosphere might blow across a continent from ocean to ocean—a hot desert wind—without a drop of rain.

Atmosphere or meteoric water falls on land as rain. A portion sinks into the earth, and, after a longer or shorter subterranean course and doing its appropriate work of rock-disintegration and soil-making, comes up again to the surface as springs. Another portion runs off the surface, cutting and carrying away the soil everywhere. Quickly, however, it gathers into rills and cuts furrows, these rills uniting into streamlets and cutting gullies. The streamlets, uniting with each other, and with water issuing from springs, form mountain-torrents, and cut out great ravines, gorges, and canons. Finally, the torrents, emerging on the plains from their mountain home, form great rivers, which deposit their freight of gathered earth and rock-fragments in their courses, and finally in the sea or lake into which they empty. Such is a condensed history of the course and work of water from the time it falls as rain until it reaches the ocean from which it came. All of this we include under river-agency. It may be defined as the work of rain and rivers, or the work of circulating meteoric water. All that follows on this subject will be but an expansion of the condensed statement given above, and much of it may be observed by any one who does not commit the mistake of thinking things insignificant because they are common.

EROSION OF RAIN AND RIVERS

The rain which falls on land-surface may be divided into three part: One part runs im-

mediately from the surface, producing universal rain-erosion and the muddy floods of the rivers. Another part sinks into the earth, and, after doing its appointed work of soil-making, reappears on the surface as springs, and forms the ordinary flow of rivers in dry times. This part joins the surface drainage, and together they concentrate their work along certain lines, and thus produce stream-erosion. A third portion never appears on the surface, but finds its way by subterranean passages, to the sea.

By the continued action of rain and rivers all lands (except someainless deserts) are being cut away and carried to sea. Every one, each in his own vicinity, may see this process going on. The soil of the hillsides is everywhere being washed away by rain, and carried off in the muddy streams. At what average rate is this washing process going on? This is a question of extreme importance.

Average Rate of Erosion.—By observations made on rivers in all parts of the world it has been estimated that all land-surfaces are being cut away at a rate of about one foot in 3,000 to 5,000 years. The Mississippi cuts down its whole drainage-basin one foot in 5,000 years, the Ganges one foot in 2,000 years. Some rivers still more rapidly than these. The rate differs in different parts of the same basin. In mountain-regions the rate is at least three times the average given above, and on steeper slopes still greater. On the lower plains the erosion is small, and in many places there is deposit instead of erosion. Making due allowance for all these variations, it is probable that all land-surfaces are being cut down and lowered by rain and river erosion at a rate of one foot in 5,000 years. At this rate, if we take the mean height of lands as 1,200 feet, and there be no antagonistic agency at work raising the land, all lands would be cut down to the sea-level and disappear in 6,000,000 years.

This universal cutting away of land-surfaces we have divided for convenience into two parts, which, however, graduate completely into each other—viz., rain-erosion and stream-erosion: the one is universal, but small and inconspicuous in any one place; the other is confined to water-channels, but works with concentrated and conspicuous effects. The one may be com-

pared to a universal sand-papering, the other to the action of the graver's tool, cutting ever deeper along the same lines. Of the two, the general rain-erosion, though less conspicuous, is probably far the greater in aggregate amount. They cooperate in cutting away the land, and, if unopposed, would finally destroy it. Pure water, however, has comparatively little effect. Its graving-tools are the sand, gravel, pebbles, and rock fragments, which it carries along in its course.—Le Conte's Compend of Geology.

By the slow but tireless agencies of erosion that have been at work since the world was created, the steril gravel under the hills about Crow Lake has been dissolving into the spring water that seeps and bubbles into the lake. The plants growing in the lake, drawing their sustenance from air and water, have caught this mineral and in the process of decay have converted it into muck—muck that in past centuries was gravel. This muck is not a complete soil in itself. Drained, it often is not worth cultivating. Ditched, it is rapidly washed to the sea. Pumped back on our fields, it supplies much of what our poor soil needs, and makes it possible to grow 31 pounds of potatoes where 6 pounds grew before.

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Lake Erie is situated on a nearly level plateau, several hundred feet above a similar plateau, on which is situated Lake Ontario. The plateaus are separated by an almost perpendicular cliff, running east and west, near Lake Ontario. The Niagara River runs out of Lake Erie, and on the Erie plateau, fifteen to eighteen miles, then drops, by a perpendicular fall, into a narrow gorge, with nearly perpendicular sides, and runs in the gorge, for seven miles, and then emerges on the Ontario plateau just before emptying into that lake.

Recession of the Falls.—Ever since their discovery, 200 years ago, the falls have steadily worked their way back toward Lake Erie. The rate of recession has been estimated at one to three feet per annum.—Le Conte's Compend of Geology.

"And God blessed them, and God said unto them; be fruitful, and multiply and replenish the earth, and SUBDUE IT: and have dominion over the fish of the sea and over the fowl of the air, and over every living thing that moveth upon the earth." Gen. 1:28.

It is a geological fact that the great water falls are huge ditching machines—curses of the fall of man—"cursed is the ground for thy sake; in sorrow shalt thou eat of it all the days of thy life." Gen. 3:17. Harnessed in obedience to Divine injunction to "subdue the earth," the water falls cease from their destructive work and crouch at the feet of man to furnish heat for his hearth stone, power for his factory and light to turn night into day. Left untamed the Niagara Falls will some day, as surely as the years come and go, enter Lake Erie with a drainage channel approximately 200 feet deep, and the Great Lakes—greatest blessing to the North American continent—will be drained. This is what has already taken place to the lakes in the southwestern part of our country where the Colorado river has drained out the lakes with a channel cut 5000 feet into the mountains and behold we have a desert; and behold where small individuals of these lakes are restored by man or nature as in the formation of Salton Sea, we have a marked increase in humidity, dew and rainfall, pointing to the great truth that with sufficient lakes, in any part of any country in any part of the world there will be sufficient rainfall.

AGRICULTURAL LEGISLATION PENDING IN MINNESOTA

DRAINAGE LAWS (From The Farmer.)

There is a widespread demand from all parts

of the state for changes in the drainage laws. The belief that something should be done is shared by most legislators, a majority of whom are actually at sea as to the best methods to pursue. There is also a feeling that the present drainage methods are too much of a "hit and miss" affair; that the work is not being done as effectively as it might be done; and that the present ditch law has worked an injustice to many landowners.

This view was shared by the Farmers' Club Federation in the adoption of this resolution.

"Whereas, the practical working out of the conditions of the present drainage ditch law imposes great hardship upon many of the farmers in the neighborhood of the ditches, amounting in some instances to a practical confiscation of their lands, be it resolved that we petition the legislature to repeal the objectionable features of the law. At least fifty per cent of the owners whose lands would be affected or could be taxed for the improvements should be required to sign the petition before any drainage project could be established and the engineer of any project should be put under bonds for five years to guarantee the proper working of the project."

The fact that it has not been required by special legislation, that the engineer be put under bond pending satisfactory results from a drainage system for a period of five years, does not justify an engineer in recommending as feasible, in direct violation of good engineering knowledge, a project that will only result in the confiscation of property of the farmers effected and will to the same extent benefit "other interests" than agricultural interests. The laws are good enough. No special legislation is needed. Either a ditch is feasible or it is not feasible. Either it will be a benefit or it will not be a benefit. A ditch that has been ordered to perform the drainage of a certain lake or marsh and it does not and cannot as layed out and dug, because it is not laid out and dug according to certain engineering

principles, drain that said lake or marsh, has been illegally ordered on "framed up evidence." A ditch that has been ordered as a benefit, in excess of costs and damages and results in damages in excess of benefits has been illegally ordered in direct violation of the drainage laws. A judge who "frames up" the evidence for ordering a ditch for the benefit of "other interests" than agricultural interests by appointing as engineers and viewers, a gang of conspirators is impeachable and is guilty of the violation of a more serious law than the mere forfeiting of a bond that might be placed on the engineer would amount to.

The farming industry.—It is the backbone of the nation. It is the source of that which sustains the race. It is the foundation upon which all other industries are built. It is at the bottom of all other enterprise. Without it there would be no commerce, no business, no great manufacturing institutions.—Pan Motor Co.

The corrupt politician and the unscrupulous promoter who, too long, have regarded the farmers as mere "suckers," may some day be unceremoniously aroused to find that they have hooked their rotten harpoons into a tender spot of a bull whale who is both capable and inclined to show fight.

This is to certify that on Dec. 27th, 1917, I was in attendance of hearing called in the court house in the city of Saint Cloud, in regard to Judicial Ditch No. 3, of Stearns and Kandiyohi counties, and I wanted to complain against having said ditch established on account of it would lower the water level under my farm, thereby hurting the growth of trees and other crops as well as spoiling the well water or likely drying the well altogether, for if we have to drive very deep wells in this vicinity the water is bad and not fit to drink. But Mr. Von Hepple, the surveyor, advised me not to make any complaint whatsoever.

State of Minnesota, County of Stearns—ss.
 Edward Erickson personally appeared before me, and after being duly sworn, deposes and says that the above is the truth and nothing but the truth.

EDWARD ERICKSON.

(SEAL)

Subscribed and sworn to before me this,
 the 29th day, of April, 1919.

OLE HENDRICKSON,
 Village Clerk, Belgrade, Minn.

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CUT WORMS, TOADS, FROGS, AND DRAINAGE

(By C. R. Sandvig in Belgrade Tribune.)

With flax quoted as high as \$4.50 a bushel in the local market many farmers in this locality have had their stand of flax so completely destroyed by cut worms as to necessitate disking it down for re-planting. Other small grains have also been damaged to some extent. Early plantings of corn have had to be transplanted. This is more than provoking, since the weather conditions up to the present have been most ideal and we have of course no assurance that it will continue ideal from now on, and may reasonably expect that corn planted now will at least be too late to produce ear corn of first quality.

It is interesting in this connection to contemplate the argument, advanced by some smart-aleck on the drainage question, to the effect that Crow Lake is good for nothing except a hatching place for frogs and toads. Toads and frogs are deadly enemies of cut worms and other destructive worms. The Farm Journal is authority for the statement that the French Department of Agriculture has estimated that a toad is worth \$9. When Linden's slough and the slough on the west side of town, as well as numerous other sloughs, had so much water in them every year as to make good breeding places for toads and frogs, the croaking of thousands of toads was a well-known sound in the summer evenings. It was not particularly beautiful music but the toads and frogs were valuable guardians of our crops and we never knew what it was to have field crops

effected by cut worms. If in addition to the drainage that has already been done Crow Lake and Skunk Lake shall also be drained, the farmers of this community may wake up to find that they may as well go loafing every spring until the cut worm has had his fill, and then plant such catch crops as may be planted after the cut worm season is over.

About seventeen years ago I came to the farm on which I am now living from Clark County, South Dakota, where we had suffered several crop failures on account of drought. I settled on this farm because it was cheap land and therefore within my means and because while it was largely composed of sloughs I saw that these could easily be drained as there was plenty of fall. With a little help and a little management the water could be made to cut its own ditch. My plan on this point proved entirely correct.

With a little help the water cut itself a channel 5 to 8 feet deep and 10 to 20 feet wide. I believed, however, that this slough or peat soil when drained would be good farm soil. On this point however, I have been more than disappointed. I have tried flax, oats, barley, wheat, corn, timothy, and clover and all such farm crops have failed to produce enough to pay going wages for man and team required to produce them. Undrained slough land on my farm, without plowing, cultivating or seeding has produced slough grass hay of greater value than the cultivated crops on the well drained land. I regard the drainage of my sloughs by the big ditch has actually resulted in a loss in my farming operations here.

I was ready to testify to the above when on the witness stand in the final hearing on the ditch case on Judicial Ditch No. 3, of Stearns and Kandiyohi counties, but the question was not brought up by the

attorneys and I only answered questions asked by the attorneys.

J. C. Saboe personally appeared before me on this, the 7th day of May, 1919, and after being duly sworn deposes and says that the above is the truth and nothing but the truth.

J. C. SABOE.

Subscribed and sworn to before me this, the 7th day of May, 1919.

OLE HENDRICKSON,
(Village Seal)
Village Clerk, Belgrade, Minn.

FOREST FIRE PREVENTION (Editorial in The Duluth News Tribune.)

The report of the state committee headed by J. L. Washburn, to investigate the causes of the recent forest fires closes with a series of eight recommendations. These are after all, the most important part of the report and they are based on the findings as to causes.

They embody the sanest, most practical and inclusive program of forest fire prevention ever framed in this state. * * * *

The recommendation as to drainage is especially timely. Over drainage is not only useless and so a waste of funds, but is often a waste of exceeding fertile lands. Unless all ditches are provided with dams to permit a stoppage of the waterflow in dry seasons and if necessary, to reflood the lands drained, then ditching should not exceed the immediate demands of settlement.

This is not a new question. Excessive drainage has been the result of selfish land exploiters being given greater influence than unselfish advisors. The late Fred von Baumbach of Alexandria, predicted 20 years ago just what is the present situation from overdrainage. But such men have been regarded as mere opponents of state settlement.

Nothing can extinguish a fire started in these drained northern peat lands but long continued rains or winter freezing and snow. As long as they burn they are a menace, and they utterly destroy the land, burning it away to a valueless subsoil or rock stratum.

DRAINAGE AND DEBT

(Editorial published both in The Minnehaha Daily News and The St. Paul Daily News.)

Drainage that adds to the productive acreage of Minnesota is worth while if the cost of ditching is less than the increase in land value.

This goes without saying: it is theoretically the basis upon which the so-called "legal" or "judicial" ditches may be ordered.

But when that system is manipulated so that it means a heavier burden of debt to the farmer and without increasing his ability to pay that debt, then such drainage isn't worth while; it drains nothing but the farmer's pocketbook.

This paper has received complaints from upstate subscribers which we believe are based upon genuine abuses. It is charged that judicial ditches are being ordered in cases where the character of the soil is such that it could not produce anything wet or dry; that promoters of ditches secure signatures to petitions by the grossest misrepresentations and that, once ordered, the law makes it practically impossible to secure a fair hearing looking to the reopening of the case and the repeal of the order. Back of it all is the uncomfortable feeling that conditions permit manipulation by rural financiers who can see a sure profit in lending the farmer money to pay his ditch assessments but who don't particularly care whether the ditch is a benefit or not.

If a drainage ditch were a comparatively small improvement, like a sidewalk in the city, the situation would not involve such hardship. Suppose you were a farmer and signed a ditch petition on the assurance that your assessment would be "about \$120" and they actually turned out to be \$1,400. In that case—and the example is a real one—you'd get off the reservation and go gunning for the system that permitted such misrepresentation. And if the drainage uncovered a fine area of barren gravel that wouldn't even produce quack grass, you'd go out with two guns instead of one.

Too many ditches have been ordered in Minnesota on the theory that the farmer is a constitutional grouch opposed to spending a cent on any sort of improvements or that he is a fool who doesn't know what is good for him.

So long as individuals are assessed to pay

for ditches, the system ought to be as open as the day and as clean as a hound's tooth. It doesn't seem to be that. The legislature ought to have more than a passing look at this thing before it adjourns.

The University of Minnesota, Department of Agriculture, University Farm, St. Paul, office of the Dean and Director.

October Sixth, 1916.

Mr. C. R. Sandvig,
Belgrade, Minnesota.

Dear Mr. Sandvig:

Your letter of September 25th was duly received and I have read it with care.

I do not believe the people of Minnesota appreciate the advantages of irrigation or the value of this muck and peat in light soils. Certainly when you can combine irrigation and the addition of peat in one process as cheaply as you seem to have done, it is a matter of the most careful consideration and I hope that our station men here may give it the consideration that it deserves.

You have certainly given much time and money to the project and your labors ought not to be lost.

Very sincerely yours,

A. F. WOODS,
Dean and Director.

Dictated by A. F. Woods—A.

October Sixteenth, 1916.

Mr. Knute Bjorka,
High School Agricultural Director,
Belgrade, Minnesota.

Dear Mr. Bjorka:

I have your letter of the 10th and have been much interested in Mr. Sandvig's irrigation project. The use of peat and muck on light soils with supplementary irrigation is a process the value of which cannot be questioned. There is not the slightest doubt in the world that it is valuable and desirable.

Yours very truly,
Dean and Director.

Dictated, A. F. Woods—A.
Copy to Mr. Sandvig.

United States Department of Agriculture,
Office of Public Roads and Rural Engineering,
Washington, D. C.

In your reply please refer to File No. F—1.

April 17, 1917, 2:00 p. m.

Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

Your letter of April 9 in further reference to the increased yields of crops of various kinds as the result of irrigation with a solution of muck is received.

As you state, the efficient production of all kinds of farm products will now be a problem of national importance and in this connection I desire to thank you, on behalf of this Department, for tendering your services free of charge in operating your farm for experimental and demonstration purposes in cooperation with this Department during the period of the war.

Very truly yours,

P. ST. J. WILSON,
Chief Engineer.

United States Department of Agriculture,
Office of Public Roads and Rural Engineering,
Washington, D. C.

In your reply please refer to File No. M-2.

Oct. 29, 1917, 4:00 p. m.

Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

We have your letter of October 20, relative to the irrigation work that you have been doing during the past year. We are glad to learn that you secured such satisfactory results. We regret that it was not possible for our representative to visit you during the past summer. Our work has been somewhat disarranged by the war, and many of our engineers have entered military service.

Mr. S. H. McCrory, Chief of Drainage Investigations, who is handling the drainage and irrigation work in the humid regions, will arrange to have one of his irrigation engineers visit you next spring if he can not inspect your plant in person.

Very truly yours,

P. ST. J. WILSON,
Chief Engineer.

United States Department of Agriculture,
Office of Public Roads and Rural Engineering,
Washington, D. C.

In your reply please refer to File No. M-2.

Jan. 14, 1918, 3:30 p. m.

Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

We are glad to have such a complete account of your proceedings, and we hope that it will not be necessary for you to give up your irrigation plant this year, as we had hoped to have one of our irrigation engineers inspect your plant early in the spring. We shall communicate with you before our engineer makes his visit.

Very truly yours,

P. ST. J. WILSON,

Chief Engineer.

United States Department of Agriculture,
Office of Public Roads and Rural Engineering,
Washington, D. C.

In your reply please refer to File No. M-2.

May 27, 1918, 2:30 p. m.

Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

Referring to our previous correspondence in regard to your irrigation work, Mr. F. W. Stanley, Senior Irrigation Engineer of this Office, will be coming east in June. If you are still carrying on your muck irrigation work he would like to stop and get in touch with the work that you are doing. Will you please advise me as to whether or not you are still on your farm and doing irrigation work?

Very truly yours,

P. ST. J. WILSON,

Chief Engineer.

United States Department of Agriculture,
Office of Public Roads and Rural Engineering,
Washington, D. C.

In your reply please refer to File No. M-2.

June 4, 1918, 2:30 p. m.

Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

We have your letter of June 1 in reply to ours of May 27. We are writing Mr. Stanley today, instructing him to stop at Belgrade and confer with you, and will send him a copy of

your letter. He will probably reach Belgrade some time the latter part of this month, although his itinerary has not been definitely arranged.

Very truly yours,
P. ST. J. WILSON,
Chief Engineer.

Twin Ports Fiber Building Co., Superior,
Wisconsin.

Jan. 13th, 1919.

Mr. C. R. Sandvig, Belgrade, Minnesota.
Dear Sir:

I have been informed that you have a power irrigation plant of your own. Would you be willing to give me some information about your plant or could I come and see you about the same? I have 200 acres of sand land between two lakes with millions of tons of muck and I intend this spring to put up an irrigation plant. If you think that you could give me some pointers on this then I would appreciate it very much. Hoping that I am not asking too much,

I am, respectfully,
P. C. N. PEDERSON,
1101-16 St.

The Northwestern Nursery Company, Capital, \$50,000.00.

Office of E. C. Hilborn, Secretary.
Valley City, North Dakota, February 26, 1919.
Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

Your article in the Journal of Jan. 25th has just been called to my attention. I remember with considerable interest hearing you talk before the Horticultural Society on this subject a few years ago. We wondered if this would not be a good idea for us to put to practical use here at our nursery. We have about 300 acres in the Sheyenne River bottom and the sluggish Sheyenne stream winds through it. The muck of which you speak covers the bottom bed and it is almost impossible for boys to wade on the river bottom.

We have been irrigating some and are about to install a larger irrigating system. Could you give us an idea of what kind of a pump to use and how to suck up the humus or muck with the pump? At the present time we have one centrifugal pump 4 in. intake.

We will greatly appreciate your advice and help and if we install this plant will be glad to pay you for your aid and service.

Yours very truly,
THE NORTHWEST NURSERY COMPANY,
E. C. Hilborn, H. S., Sec'y,

The Hartford Fire Insurance Company,
Western Department, 39 South LaSalle Street,
Chicago. C. R. Vollmer, Agent, Winstead,
Minn.

January 30, 1919.

Mr. C. R. Sandvig, Belgrade, Minnesota.

Dear Sir:

I was much interested in your article 'How to irrigate with muck' in the Minneapolis Journal.

On my farm I have a large muck lake and have often thought I would like to get this muck out on the adjoining marsh and also on the higher unfertile hills, but the machinery and pumps have been puzzling.

Would be pleased to hear more of your plan and pump if you wish to write me.

Yours very truly,
C. R. VOLMER.

SANDVIG TODAY TELLS OF MUCK FARMING HERE

HAS SYSTEM OF PUMPING MUCK SOLUTION FROM LAKE TO IMPROVE HIS LAND—IS ONE OF PRINCIPAL OBJECTORS TO JUDICIAL DITCH OF TWO COUNTIES.

(St. Cloud Journal-Press, Feb. 28, 1918.)

C. R. Sandvig, one of the principal objectors in the matter of Judicial Ditch No. 3 for Stearns and Kandiyohi counties is today on the witness stand in the final hearing on the ditch.

Mr. Sandvig is conducting a fruit and truck farm on the shores of Crow Lake. He has constructed a plant for the purpose of getting the muck from the bottom of the lake, spreading it over his land as a fertilizer by a system of irrigation.

The objection that Mr. Sandvig places is that the drainage of the ditch, along with robbing that section of the county of a lot of beau-

ty, will destroy the source of his wealth, he claiming that the value of his land is higher because of his system of muck farming. He has found the system very advantageous and has received many comments from the state and United States departments of agriculture.

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DITCH CONTROVERSY POSTPONED FOR TWO MONTHS TO GIVE PETITIONERS CHANCE TO GET EXPERT TESTIMONY.

(The St. Cloud Daily Times, Friday, December 28, 1917.)

The controversy pertaining to the Stearns-Kandiyohi county ditch project, involving an estimated expenditure of \$150,000 and the draining of Crow Lake will not be brought before the court for final hearing until Feb. 19.

This was decided in district court this morning when petitioners asked for a continuance to give them time to submit expert evidence bearing on their contentions in the matter.

There was some objection raised to the continuance by Attorneys Anderson of Hutchinson and Johnson of Willmar for the objectors, owing, they said, to the fact that they had all their witnesses with them, and it would be a great deal of inconvenience to the negative side.

Attorneys J. D. Sullivan of St. Cloud and Tollman of Paynesville, representing the petitioners, however, insisted that they would be unable to present their side of the case at this time owing to the fact that Engineer S. S. Chute, who did part of the surveying, would not be present and it would not be possible to bring out certain things which they proposed to bring out through him. Mr. Chute, it was stated, is ill.

The court after hearing the arguments on the motion for continuance decided to postpone the hearing of the case until February 19.

The court room was well filled when the case was called before Judge Roeser this morning. Soon afterward, it was, the petitioners asked for a continuance.

DITCH HEARING CONTINUED TO FEBRUARY 19 ON MOTION OF PETITIONERS IN MATTER.

(The Daily Journal-Press, St. Cloud, Friday, December 28, 1917.)

The final hearing on the petition for Judicial Ditch No. 3 for the counties of Stearns and Kandiyohi and on the reports of the engineers and viewers in the matter was continued today to February 19 on motion of the petitioners.

Attorneys for the petitioners stated that they were not aware of the presence of any serious objections until this morning and the Judge ruled that additional time was necessary for them to prepare their evidence. The petitioners also claimed the absence of Surveyor Chute as cause for continuance.

About 50 farmers had come to St. Cloud yesterday to be present at the hearing and to submit their objections. The absence of Judge Roeser made it impossible to hold the hearing yesterday and the farmers remained over until today.

"The interest of Mr. Borgerding, associated with the petitioners, is evidenced by his presence here," stated C. R. Sandvig, one of the principal objectors, this morning. "I personally overheard Mr. Borgerding making overtures to two of the objectors asking them to drop their objections if the ditch were stopped before reaching their property, thus eliminating their assessments. The ditch, as it is laid out, is not feasible. An attempt will be made to drain Crow Lake into sluggish and stagnant water, into a peat bog formed by the back waters of the mill dam at New London. The objectors are considering their own interests and the damage that will result to them if this ditch is constructed cannot be repaid. The beauty of our homes on the lake shore will be destroyed and the lake bottom will not be reclaimed. The muck at the bottom of the lake ranges from a depth of 10 to 30 feet."

Attorneys Sullivan and Tolman are appearing for the petitioners and Anderson and Johnson for the objectors.

FARMERS RAISE OBJECTION TO BIG DITCH PROJECT IN STEARNS AND KANDIYOHİ COUNTIES; COST \$150,000.

(St. Cloud Daily Times, Thursday, December 27, 1917.)

Notification was received from Judge John A. Roeser from Moorhead this morning stating that he was unable to get to St. Cloud today for the ditch hearing and requested that the entire matter be continued until tomorrow morning. That much interest is taken in the construction of this Crow Lake ditch may be judged from the attendance at the court chambers this morning, there being about 50 farmers present with their attorneys.

The ditch with its laterals is about 30 miles long and passes through Stearns and Kandiyohi counties and involves the drainage of Crow Lake which covers about five hundred acres of land. The approximate cost to the farmers for the construction is \$150,000, according to the statements made by some of the men in attendance.

IS A FINANCIAL SCHEME

"We are being netted into paying large sums," said C. R. Sandvig, one of the farmers whose land will be affected by the ditch, "to have work done which will be a damage to all of us as well as to the beauty of the community. The whole thing is a financial scheme put forth by bankers in our vicinity. To construct the ditch will cost about \$150,000, and the farmers will have to pay for this with money they borrow from these bankers and for which they will pay interest at the rate of about 8 per cent. It is therefore very easy to see why the bankers are very anxious to have the construction of the ditch carried out. In the next place," continued Mr. Sandvig, "the ditch will damage Crow Lake by draining it, which will mean the loss of a natural beauty spot to us who have built our homes about the lake, as well as a decrease in the producing power of our lands because of the decrease in the amount of moisture in the soil. As it is the land does not retain moisture any great length of time and with the loss of the reservoir, Crow Lake, our farms certainly would be permanently damaged."

Concerning Mr. Sandvig, it might be stated that he is conducting an orchard on the shores of Crow Lake, and is not only a trained horticulturist, but is a well educated natural scientist. He has instituted an irrigation and fertilization scheme on his property which at present is being given much attention by the State and National government agricultural departments. He has an engine which pumps water and lake muck onto his orchard soil at a very small cost. The process not only benefits the soil but keeps the lake cleared of the floating muck as well.

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JUDICIAL DITCH WOULD TEND TO MAKE VERITABLE DESERT OF NOW PROSPEROUS COUNTRY.

(The Daily Journal-Press, St. Cloud, December 27, 1917.)

That the proposed judicial ditch No. 3, the hearing on which was postponed because of the absence of Judge Roeser, will make a veritable desert of the rich agricultural territory of Stearns and Kandiyohi counties which it will drain of its surface water, is the assertion made by C. R. Sandvig of Belgrade this morning.

Mr. Sandvig is one of the objectors to the project. He stated that the agitation for the Judicial ditch had been started by Christ Borgerding, a banker, so that said banker might have an opportunity to loan a lot of money to farmers in the territory drained and supposed to be benefitted by the drainage project.

"It will do us no good at all," stated Mr. Sandvig, "and will cost a lot of us a big sum of money for turning our land into a desert. The land in the vicinity of Crow Lake, the body of water to be drained, is dry enough now. There is a surface soil of sandy loam over a subsoil of light hardpan and gravel. That soil needs all the water it can get."

"To make my own land profitable I have built an irrigation plant and my farm of 33 acres borders on the shores of the lake. There are about 500 acres of land covered by the lake and only a very small part of this will be available for farming purposes because there is a muck bottom of ten or 30 feet. Many farmers have built beautiful homes on the shore of the

lake and these homes will be made almost valueless."

Mr. Sandvig is engaged in fruit growing. He has an orchard of 33 acres. He pumps his water from Crow Lake so that his orchard is profitable. He fertilizes his land by pumping the muck from the bottom of the lake onto land with the water. He has installed a 7 H. P. kerosene engine which pumps 900 tons of water and muck solution in ten hours. That is about a ten per cent solution.

The "muck" farmer has gone to a great expense in installing this system and in making his home on the shores of the lake beautiful. The state and federal departments of agriculture have complimented him upon his success in this venture and have sent special agents to his farm to study his plan.

Mr. Sandvig has a lot of photographs of the lake and the lake shore to show the beauty of it at the hearing. About 50 farmers were present in the court room this morning. Judge Roeser was unavoidably detained at Moorehead and the hearing will probably be held tomorrow.

PEAT SOILS OF MINNESOTA AND THEIR CULTIVATION

(From *The Farmer, A Journal of Agriculture*, St. Paul, Minn.)

It must be clearly understood that these peat areas are not all of the same character and that they will not yield to the same treatment for agricultural purposes. As a matter of fact there are a dozen different kinds of peat in Minnesota, often differing radically in the same bog. Peat is formed during periods of thousands of years by the decay of vegetable matter in lakes and ponds, and in low places where the water level remains constantly at the surface. As these aquatic plants die and decompose, they form successive layers of decayed vegetable matter at the bottom, gradually building up until we have the peat deposits of today. According to the kind of plants, and the mineral agencies which have assisted in their decomposition, the peat will vary in character. A peculiar characteristic of peat soils is that they are especially subject to summer frosts, not be-

cause they occupy low places, but because of the rapid radiation of heat from the surface of the peat. These subnormal temperatures may be prevented by covering the peat with a few inches of sand, loam or clay.

Ordinarily, farmers with small bogs are leaving them untouched, or using them as poor hay fields or still poorer pastures; and those who are trying to raise crops by the same methods employed on their ordinary soils, are doing so usually with very discouraging results. Even where the land is satisfactorily drained, natural peat soil has proven to be very low in productivity; and the vast majority of these areas lie idle and undeveloped. In 1917 the State Legislature appropriated \$6,000 a year for two years to be used by the State Experiment Station in making investigations of peat soils for agricultural purposes. This year the Legislature is asked for \$10,000 a year to continue and extend these investigations.

The appropriation of 1917 required that experiments should be conducted on three tracts of peat soil, not less than 10 acres nor more than 40 acres in each—one to be located in Beltrami or some county west of that, a second to be located in some northeastern county, and a third to be located in the southern half of the state. According to these provisions, in 1917 Dr. F J. Alway of the Division of Soils, State Experiment Station, made his selections of experimental plots and proceeded to work.

For the northwestern section he selected a piece of land near Golden valley, in Marshall County.

At Fens and at Coon Creek the experimental tests last year were not so satisfactory as at Golden Valley.

At Golden Valley, on the other hand, conditions for the preparation of the soil were most satisfactory, and a splendid season last year, remarkably free from summer frosts, lent every encouragement to the conduct of comparative tests. Hence, the Golden Valley results are the first to be made public.

Before quoting these results, owners of peat land in other sections of the state should be warned that the success of a certain treatment at Golden Valley does not mean that the same treatment will prove successful with them.

It may and it may not. Peat soils differ very radically in their composition and in the treatment which they require.

In selecting a representative plot, Dr. Alway wanted a field of peat, a part of which had never been burned, manured or fertilized, while another part had just been burned. He found this on the farm of Mrs. T. G. Dahl at Golden Valley. This land had been homesteaded in 1911 when it was in a wild and undrained condition. In 1912 a large open ditch was dug past the farm.

The peat varied in thickness from a few inches to more than three feet. It had been pastured in 1911, 1912 and 1913, and in the autumn of the latter year it was broken eight or nine inches deep. The next year it was seeded to flax, yielding only about three bushels per acre. In 1915 a crop of oats proved a complete failure. The following season part of it was seeded to oats and part to barley, but both crops were failures. In October of that year part of the field was burned over lightly, and on this part a satisfactory crop of oats was secured in 1917. The other portion of the field which, had not been burned, was again sown to oats in 1917 and seeded with timothy and clover; and again the oats proved a failure, while only a fair stand of timothy and clover was secured. Thus, in four years, the only real crop which this land had produced was a crop of oats on the peat which had been lightly burned.

These farming results were typical of the entire district. The natural productivity of the peat lands was and is, very low.

After harvest in 1917 when Dr. Alway took over the land at Golden Valley, fires again started in portions of the peat and were allowed to continue until October.

Previous investigations of peat in this territory had shown that no nitrogen or lime was required.

The phosphate used was acid phosphate, 400 pounds per acre, costing \$4.60 per acre and carrying 15 per cent of phosphate. The potash used was Nebraska potash salts, 1,000 pounds per acre, costing \$53 per acre and carrying 28 per cent of potash. The manure used was fresh horse manure such as may be found on any farm, which carries about five pounds of

phosphate per ton. It was applied at the rate of 12 tons per acre to supply the same amount of phosphate per acre as the 400 pounds of acid phosphate. Obviously, the phosphate and manure are cheaper than the potash, and fortunately these were the fertilizers that were found to be required.

	YIELDS OF GRAIN AND ROOTS IN BUSHELS PER ACRE AT GOLDEN VALLEY				BURNED PEAT	
	UNBURNED PEAT		BURNED PEAT			
	Potash	Phosphate	Manure	Plowed and rolled		
No manure or fertilizer						
Wheat	6.6	6.6	4.8	13.9	12.5	
Spring rye	14.6	14.1	39.6	45.6	46.0	
Oats	32.8	35.0	81.3	71.7	53.3	
Barley—oberbrucker	7.4	11.2	24.6	30.0	42.6	
Barley—local variety	14.4	14.1	26.3	31.7	47.2	
Flax	8.2	8.7	5.9	7.7	10.7	
Field peas	10.8	10.2	18.2	15.7	24.2	
Potatoes	59.0	63.0	90.0	101.0	102.0	
Rutabagas	45.0	35.0	144.0	148.0	241.0	
 YIELDS OF CURED HAY AND GREEN RAPE IN TONS PER ACRE						
Red clover, timothy and redtop	0.04	0.04	0.84	0.60	0.66	
Alsike, timothy and redtop	0.04	0.04	0.80	0.44	0.68	
Alfalfa	0.04	0.04	0.50	0.20	0.66	
Sweet clover	0.04	0.36	2.58	3.64	2.64	
Brome grass	0.04	0.06	0.62	0.64	0.44	
Western rye grass	0.12	0.16	1.18	0.72	0.68	
Rape—green	1.70	1.80	12.20	12.70	11.40	

It is interesting to know, too, that the amount of phosphate liberated in peat by burning a six inch layer off of the surface amounts to 300 pounds of phosphate per acre, which is equal to the amount of phosphate contained in 2,000 pounds of acid phosphate or 60 tons of ordinary stable manure.

In that section the owner of deep peat land has three methods of procedure before him. If

the season is dry, he may burn the top layer of his soil and obtain available phosphate in that way. If he cannot burn, he may apply the phosphate in the form of stable manure. And if the manure is not obtainable, he will have to buy acid phosphate. Where acid phosphate can be obtained his county agent should be able to tell him.

Obviously, one treatment of acid phosphate or manure will not produce large crops over a period of years. It must be renewed. Dr. Alway recommends a liberal dressing of phosphate fertilizers in the first year (as was applied to his experimental plots), followed by lighter applications in succeeding years. The length of time burning will suffice to make peat soil productive probably depends upon the depth of the remaining peat layer.

Dr. Alway urges farmers in Northwestern Minnesota not to accept these results as final, but first to try them in an experimental way.

As to the owners of peat land in other sections of the state, these experiments are not intended to apply except possibly in a suggestive way. Singularly, all the knowledge obtainable as to the cultivation of peat soils in other lands indicates potash as the principal fertilizing element lacking. It may be that peat soils in other sections of Minnesota require potash or lime, or both, rather than phosphate. Owners of such soils may experiment with these three fertilizers to their heart's content.

This corroborates the evidence brought out by Sandvig by his own testimony and his cross examination of the state's witnesses; that plants drawing their sustenance from air and water decaying after maturing creates the muck and peat as we have it and would, if nature were left to finish its work, build up these deposits into dry ground without the expensive ditches which benefit principally "other interests" than agricultural interests. The researches quoted above also corroborate the evidence introduced by Sandvig that peat and muck is not a good or perfect soil. The above information also places the agricultural College as one of the "other interests"

than agricultural interests. Six thousand dollars a year was obtained for the agricultural College as a starter. After only 2 years \$10,000 a year of the "tainted drainage money" is asked. In the statement, "Peat soils differ very radically in their composition and in the treatment which they require," we have an intimation that there may be no limit to the appropriations of "tainted money" that the Agricultural College can make use of, in operating experiments on every drained 40 acre plat, to determine how much "benefits" the farmer will need to pay the "manufacturers of commercial fertilizers" before the farmer can raise even a single crop. First, the Agricultural College, knowing professionally even before the farmers began to learn by the bitter lessons of experience, that peat and muck soils are worthless advocated drainage—in fact carried on a drainage propaganda service with the very funds entrusted to it for difusing **VALUABLE** agricultural knowledge. Now that the mischief of drainage has been done, they are after big and still bigger chunks of "tainted money" to conduct experiments to determine what kind and how much "commercial fertilizers" a farmer will have to buy to produce each uncertain crop. We may expect that the Agricultural College will soon go after appropriations of "tainted money" for conducting experiments to determine what kind and how much "commercial poisons" a farmer will have to buy per acre to combat the cut worms.

The suggestion that farmers who have been plundered by the drainage octopus may still obtain one "satisfactory" crop of "oats" (perhaps wild oats) by burning the peat must be considered at its face value in connection with the fact that in the fall of 1918 about 1,000 human lives were murdered in

Minnesota by "burning the peat"—by fires that spread from burning peat bogs. There is no logical reason why heads of departments of Agricultural Colleges when they become responsible for the slaughter of human lives should not be tried and punished for the same, in identically the same way as railroad engineers when they become responsible for the slaughter of human lives are tried and punished for the same. One thousand human lives were slaughtered because fires had been kindled and because drainage had made peat bogs and timber mulch dry enough to burn, with a holocaust that made escape in speedy automobiles a tragedy.

We could not publish the entire two-page article but publish the principal portions, including the table of results, which is really remarkable in that it indicates that at a cost of \$6,000 per year the Chief of Division of Soils has at a cost of \$4.60 to \$53.00 per acre for commercial fertilizers obtained some remarkable crop increases on one out of three 10 to 40 acre plats of peat soil for a single, exceptionally favorable season; and ordinary farmers are warned that they really must not expect to obtain the same results by just copying the same methods. The experiments conducted by the Chief of Division of Soils does not prove that drainage is a "benefit" except to "other interests" than agricultural interests.

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HOW TO TREAT SURPLUS SUPPLIES OF WATER

MUST BE MADE TO GATHER PLANT FOOD,
AND STORED IN THE SOIL.

In the Jan. 17, issue, the Minneapolis Journal editorializes on Minnesota's surplus water supply, and in the Jan. 24, issue, Mr. Ed L. Peet advises what he thinks should be done with this surplus. Both articles follow:

Topographically Minnesota is a shallow pan on a high shelf—a plateau one thousand feet

above the sea and the starting place of three great water systems. Minnesota is truly the Mother of Waters. In the process of making the land bring forth food the disposition of this water is the problem that leads all others.

The successful management of Minnesota's surplus waters is a problem appalling to men wise enough to comprehend it. A generation of haphazard ditching has produced a scramble of drains that often work great mischief. There are drains that convert beneficent marshes into fire traps, and make useless swamps out of food-producing lakes. There are ditch systems which empty waste water recklessly upon well drained farms.

Tiling and ditching, undertaken in order to make land fertile, revolutionize the flood question. The Dayton and Hamilton floods in Ohio proved that tiles bring water to the valleys with a rush that may be disastrous. Impounding flood waters is a vital factor in the drainage problem.

HOW TO TREAT SURPLUS SUPPLIES OF WATER.

To the Editor of the Journal:

The "Minnesota Surplus Water" editorial that appeared in the Journal Jan. 17 is the best statement I have ever seen of a real danger that confronts the state. Calling Minnesota "a shallow pan on a high shelf" is wonderfully apt. This pan may be a blessing or a curse as it is treated.

One set of men are ever trying to heap up the edges and store more water in the pan and another set seek to remove the edges and take out all the water. Either method is dangerous. Water held in ordinary reservoirs is liable to break forth at any time and destroy lives and property. Ditches and tiles that carry away more than an even flood of water after every rain bring disaster lower down.

The swamp water is rich in plant food. Why not raise this water out of the swamp and spread it with all its richness over the land instead of dumping it on our neighbor below and finally letting it pass to the bottom of the ocean?

A hundred miles west of Minneapolis lives a mechanic on the shore of a lake. To clean out this lake he made a reservoir on his little

farm and pumped the mud up into it. Much of the water soaked into the ground but lots of it carried the mud (rich plant food) to his growing crops and pumped the food into the veins of the plants. He irrigated and fertilized at the same time. Last season he was the only man for miles around who raised any small fruit. Drouth came when the plants needed water, but Mr. Mechanic got a crop when Mr. Farmer dried out.

This man with a plant costing \$500 raises 1,000 tons of muddy water 20 feet in 10 hours with an operating expense of less than \$5. Sometimes this water carries 10 per cent of plant food. The cost is insignificant. If this plant was running steadily 24 hours every day for seven months in the year it would take enough mud out of the swamp or lake to make room for a lot of new rain water. Or if the system was worked on a large scale whole swamps could be changed into beautiful lakes in a single season.

Thousands of acres in Minnesota are very sandy. Where there is sandy land in this state there is always a swamp close by. Many of these swamps when drained are not productive.

The same labor that would be employed in impounding waters with dams and lowering water with ditches would pump the plant food over thousands of acres and the increase in crops would pay for the labor almost from the start.

Undrainable swamps and muddy lakes can be cleared out and the fertilizer placed on the land at a cost much less than that of hauling out the same value of plant food from the barn-yard manure pile.

In the district over which the great forest fire raged last fall there would have been no danger from spreading fires had there been an irrigating fertilizing reservoir at the high spots through the cut over land. Even if there had been no cultivated fields near at hand to use the mud, there would have been seepage enough from the reservoir to have moistened the ground so that fires would not have spread. In reforestation the reservoirs are valuable. I can show you lands where moisture has been properly conserved and the trees have grown in 20 years from seed to more than a foot through,

while other trees near by, of the same kind and on the same kind of land not taken care of have grown but a single inch in the same time. All due to the difference in moisture deposited at the tree root.

The net cost of deepening the pan will be absolutely nothing if the mud removed is so placed that it will enrich land as the new crop will more than pay back the money expended.

There is no limit to what good engineers can do in carrying out this plan. Water that should go down the streams in an even flow every day of the year, free from plant food could be used to generate electricity and run all the pumps required to lift the mud solution to the summits. Millions of gallons of water could be stored in the ground as it soaked down from the reservoirs on the higher ground and as it soaked away it would come out lower down in springs, either open or under the waters of the lakes.

Years might be occupied in cleaning the pan but while the work is going on the good results obtainable from year to year would be so satisfactory that we would contemplate with pleasure the great prospects ahead along similar lines for our descendants. We can not afford to increase the water surface of this pan neither should we destroy it by letting all the water out of it in floods. Every drop of water that comes to Minnesota should be kept here until it is utilized to create power, feed plants or is sent by evaporation to our unfortunate neighbors in the drouth stricken regions.

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HOW TO IRRIGATE WITH MUCK; SURFACE WATER.

C. R. SANDVIG OF BELGRADE, MINN., TELLS HOW MUCK CAN BE PUMPED ON-TO FARM LANDS.

In the January 29 issue of the Minneapolis Journal, appeared the following communication on muck irrigation:

To the Editor of the Journal:

Muck in the water cheapens irrigation, just as lubricating oil cuts down the expense of running a car. There is no power in lubricating oil. It is in fact an extra expense but it

is an "extra expense" that actually makes it cheaper to run a car than without this extra expense. In practically the same way the extra expense and equipment required for dredging muck into the irrigation water makes it cheaper to irrigate. With muck there is less loss of water in ditches from seepage, just as there is less friction in a car when using lubricating oils. With muck the ground is "sealed up" as it receives the amount of water it requires. Irrigating sandy soil with clear water is like trying to fill a bottomless bucket. The water drops down through, requiring a much larger stream to make it flow down along the rows. A larger stream requires a larger pump and of course a greater operating expense. A large stream of clear water will pick up humus in the soil and wash it away, with the result that after each irrigation the soil is left poorer. The poorer the soil the oftener it needs water. The result of irrigating with clear water is therefore: the more you irrigate the oftener you will have to irrigate. In irrigating with muck the deposit retains moisture. This muck, once incorporated with the soil, also absorbs moisture from rains and melting snows, with the result that the oftener you irrigate (with muck) the less you have to irrigate.

Irrigation with muck is not patented. The finished idea and simple equipment is my contribution to a starving world to help it obtain more bread on less land and with less labor. Ed L. Peet is only one of many who have come to investigate it. Others have come from distant states. I meant well. I meant to give this idea, worth billions of dollars to a starving world without exacting tribute on a patented monopoly. Now a time limit has expired since the idea was perfected by which I have forfeited the right to a patent. But, now, too late, I have learned the sad lesson that an idea that is not patented is like a ship in mid-ocean without either engines or sails. It has to be salvaged. It has to be taken in tow. There is no one to advertise for profit an idea that is not patented. It has to be given publicity in the same spirit in which it was given to the world. The press will have to give this idea publicity for patriotic reasons instead of for "so much" as advertisements.

CROSS EXAMINATION OF STATE'S WITNESSES,
EVIDENCE AND TESTIMONY BY C. R. SAND-
VIG—(THE "FARMER.")

Mr Sandvig: I will offer as exhibit a sample of spring water taken at Wiebe's spring by myself. It is not intended as a sample of lake water, but as spring water.

Mr. Sullivan: I will waive any objection.

Mr Sandvig: I would like to make the reservation that I may drink out of this as long as it lasts.

Mr. Sullivan: No objection on our part. You can have some out of our bottles for a wash.

Mr Sandvig: As Mr. Sullivan raises the point, I propose to prove that this is better than St. Cloud slough water. (Witness takes a drink of the water.)

Marked for identification, Sandvig's Exhibit 1.

Mr. Sandvig: I would also offer as exhibit, sample of muck taken from Crow Lake by myself; known to be muck taken from Crow Lake, for exhibit and demonstration purposes.

Marked for identification, Sandvig's Exhibit 2.

The Court: Any objection to the offer?

Mr. Sullivan: No; no objection.

The Court: It is received.

Mr. Sandvig: I also offer for exhibit and demonstration purposes a sample of our surface soil.

The Court: Taken where?

Mr. Sandvig: In the vicinity of Crow Lake; taken by myself.

Mr. Sullivan: State where you took it.

Mr. Sandvig: Well, this was taken from flat ground, as it was more convenient; I took it from Mr. Linderholm's farm.

Mr. Sullivan: At what distance from the lake?

Mr. Sandvig: Well, within a quarter of a mile.

The Court: Any objection?

Mr. Sullivan: No.

The Court: Received.

Mr. Sandvig: I also offer a number of photographs taken by myself and known to be correct according to the limitations of the camera, for convenience nailed on the two sides of a board.

Marked for identification, on one side, Sandvig's Exhibit 4, and on the other side, Sandvig's Exhibit 5. The individual photographs comprising said Exhibit 4, were then marked for identification 4-A to 4-I, inclusive; likewise the individual photographs comprising said Exhibit 5 were identified individually 5-A to 5-I inclusive.

Mr. Sullivan: No objection.

The Court: They are received.

Mr. Sandvig: I will offer an additional photograph taken by myself in front of my property, showing conditions that did exist.

The Court: At what time?

Mr. Sandvig: I think 1916.

Mr. Sullivan: No objection.

Marked for identification, Sandvig's Exhibit 6.

THE LAWYERS FAIL IN AN EARLY ATTEMPT
TO CONFUSE AND EMBARRASS THE "FARM-
ER" WITH COURT RULES AND LAWYERS
TRICKS.

Mr. Sandvig: I wish to state that my position is made difficult;

Mr. Sullivan: Now, just a moment; is the gentleman testifying or is he going to make an argument?

The Court: I presume he is still under oath. He was sworn in this case already.

Mr. Sullivan: Well, then if it is testimony I object to it as incompetent, argumentative, stating an opinion. I shall object to declamations and speeches under the guise of evidence.

Mr. Sandvig: I believe I have a right to both evidence and argument.

The Court: Well, not at the same time. You have a right to introduce your evidence the same as the others and be subject to cross examination, and make your arguments after the completion of the testimony.

Mr. Sullivan: Yes; I want to be liberal.

Mr. Sandvig: You want me to introduce as evidence all my testimony first, and then make arguments afterwards?

The Court: Yes, that is the ordinary way.

Mr. Sandvig: Well, what I started to say is not bearing on that. I wish to say that my position is made difficult by reason of the fact that in the evidence already submitted, some points of which have been at issue, the petitioners have given the best side of the evidence for my purpose.

Mr. Sullivan: Now, if your Honor please, this is an argument.

Mr. Sandvig: I just wish to review the points in which I don't want to raise any issue with the petitioner's witnesses.

The Court: Well, are you making an opening statement?

Mr. Sandvig: Well, perhaps it is.

Mr Sullivan: Well, even in an opening statement it is incompetent to comment on the sufficiency of our evidence.

Mr. Sandvig: Well, it is immaterial as to whether I explain what points I want to take up, just as Mr. Sullivan and his witnesses presented them, or not. I simply thought that it was simplifying matters.

THE "FARMER" DISPLAYS A SCIENTIFIC KNOWLEDGE OF PHOTOGRAPHY, BOTANY, AND DRAINAGE ENGINEERING. WITH TRUE LAWYER INSTINCT HE BRINGS OUT NEW LIGHT ON THE COMPLEX DRAINAGE PROBLEM. (SEE EXHIBITS ON FILE WITH CLERK OF SUPREME COURT.)

I wish to call on Mr. Chute.

SAMUEL S. CHUTE, a witness on the part of the petitioners, was then recalled, for cross examination, and testified as follows.

Examination conducted by C. R Sandvig:

Q. Exhibit E, wishing to refer to Exhibit E, you have stated that this was taken under your observations or according to your directions? A. It was taken under my direction.

Q. And is a portion of Crow Lake? A. Yes sir.

Q. That was taken from a boat? A. No sir.

Q. By wading out into the waters and pointing the camera towards shore? A. My instructions were to take that from the edge of the water and follow along the shore, with the camera pointing along the shore, so as to show the nature of the vegetation as you leave the shore and out towards the lake.

Q. This picture was taken from a point not very far from the shore the camera pointing towards the shore, and not very much of an angle along the shore, as you will see? A. That picture was taken on the south bank of the lake from a point on the shore.

Q. On the shore, taking the shore from the shore? A. Taking the shore and taking in that point which protrudes out into the lake, and shows a bay on the westerly side of the point of timber which runs out on the south bank of Crow Lake.

Q. I fail to see the indications in the picture that it was taken from the shore. A. I am sorry you can't see them; I can.

Q. Well, as a matter of fact, how big a portion of Crow Lake does that show? A. Very small portion; simply that bay there, probably four acres of that

bay.

Q. Is there more than half an acre of Crow Lake shown in that picture? A. Yes, best of my judgment there is about four acres of that bay shown there.

Q. It is a very small portion of Crow Lake over one of the widest bays that you could find? A. It was taken not at points directed by me, but taken as directed, to find points which would show the character of the vegetation along the shores and extending out into the lake.

Q. And referring to Exhibit D, that also was taken from a point out in the lake, with the camera pointing towards shore at a distance of not more than three rods from the shore, was it not? A. That picture was taken on the north side of the lake, and taken from the shore.

Q. Pointing towards the shore? A. Pointing towards a point of the shore which extends out into the lake.

Q. According to these pictures there must be some very sharp points in that lake, if they are taken as you specify. A. The points are exactly as shown on the photograph, by that photograph.

Mr. Sandvig: Your Honor, I wish to call your attention to the fact that those pictures show in the foreground a portion of muddy water, and in the background the shore. How can a picture be taken from the shore showing the shore, unless there is a half moon or circle shore around the lake, which there is not to my knowledge?

The Court: Well, that of course is a matter of argument; go ahead with your examination of Mr. Chute.

Q. Referring to Exhibit C, this is a photograph taken from out in the lake with the camera pointing directly towards shore at a distance of about ten or fifteen rods from the shore? A. No sir, there is none of those pictures taken from out in the lake; they are all on the shore.

Q. How can you get the shore in the background of the,—if it was taking a picture from the shore? A. Well, there is dents and bayous in that lake, and bays; picture shows for itself.

Q. That is just the point; the picture shows for itself. A. None of those photographs were taken from a boat in the lake; they were all taken from the shore.

Mr. Sandvig: I call the attention of the Court to that photograph, and what the indications are.

Q. Referring to Exhibit G, this is a view taken from about the point where the ditch runs out of the lake, into the shore, is it not? A. Taken from a point slightly north of where the ditch runs out of the lake.

Q. Well, within five rods? A. Well about, I should say about five or six rods north of the outlet, that was taken.

Q. How much open water is shown in the foreground of that picture? A. Well, it is impossible to state how much open water; you can see the first patch of open water pretty near shore.

Q. Yes. A. Well, I couldn't tell from the picture, but I can tell from what I know of the lake that there is about an acre or two there of open water.

Mr. Sullivan: Now, Your Honor, this line of testimony is not directed towards Mr. Sandvig's proposition over there on the lake. I thought he was going to bring up something we had not gone over before.

Mr. Sandvig: I am pleading my own case, and I propose to make objection to any point at issue, which I have a right to.

The Court: Well, of course, if we had known that, we would not have closed that part. Well, go ahead. Make it as brief as possible. I don't want to shut out anybody.

Q. Beyond this very small opening of water there seems a fringe of weeds, how wide is that fringe of weeds? A. Well, in different seasons that is different. I can't tell. That is a bunch of green weeds there, probably twenty rods across it, I should judge that first batch, but there is weeds that stick up to the top of the water that cannot be seen on that photograph.

Q. Twenty rods? A. Yes, I should judge that.

Q. And that scene has been placed in such a way so that the weeds make it appear as if practically the whole lake is weeds. And referring to Exhibit F, this view was taken from a point about twenty rods back from the shore, in the west end? A. No sir, it was taken from the bank's edge on the west shore.

Q. From the water's edge with trees growing in the water? A. Willows and small trees, small brush; I don't know that there is any trees.

Q. How much of the west end, the distance, what is the distance in the west end covered by these weeds? A. Oh, it is about a quarter of a mile I guess; that is, I mean when the lake is entirely full of weeds it is a quarter of a mile from the shore.

Q. The picture was posed in such a way as to in-

dicate that the whole of the lake is practically covered with weeds. You probably heard testimony made by Mr. Bradley, I believe, in regard to the plants in the lake deriving some of their plant food from the water and air? A. I didn't hear any testimony of his to that effect.

Q. What is your knowledge on that question?

A. Don't know anything about it.

Q. Don' know anything about it? A. I am not a botanist.

Q. You didn't hear Mr. Bradley testify on that point? A. No sir.

Q. Well, assuming that his testimony was correct, that the vegetable plants would derive some of their plant food from the water and the air, the lake would be gradually filling in with muck more and more from year to year as these plants decayed, would it not? A. I presume.

Q. Referring to Exhibit—Sandvig's Exhibit 6, which shows a portion of the shore line as it was in front of my place in process of improvement, you probably noticed that at various points, some points in the bays about that lake there is a vegetable growth of slough grass extending out into the lake, did you not? A. Yes, there is every kind of vegetation that grows in a slough; everything that grows in a slough is in that lake, that I know of.

Q. You probably realize that this slough grass sod is creeping out into the lake; is that not the nature of things in these muck lakes? A. Yes sir.

Q. This slough grass portion of the lake is what you would really call of a marshy condition without any question, is it not? A. Oh yes.

Q. No question on that point. It looks as if, you don't see any water, and still if you walk out on it you may sink down with hip rubber boots? A. It is marshy.

Q. Where this slough grass covers the lake it is decidedly marshy? A. Yes, and other places too.

Q. This condition is creeping out into the lake?

A. Yes sir.

Q. Now, you testified that the ditch had been laid on a level for three miles? A. Yes sir.

Q. In order to prevent the muck from rushing out through the ditch? A. Yes.

Q. Now, in case these drainage proceedings should have been delayed until that marshy condition would have covered the lake, assuming that it would, there would not have been so much danger of the muck and semi-liquid fluid in that lake rushing out

after it is once covered by and held down by slough grass sod? A. The drier it gets.

Q. Aside from the question of drying, this slough grass would hold the muck together? A. Where there is slough grass it would hold the muck together.

Q. After a lake is once covered with slough grass it will stick together certainly? A. Certainly, if you get it into a really nice meadow it will absolutely stick together.

Q. In these drainage laws I suppose we may assume that the Legislators consulted the State Drainage Engineer, or good drainage engineers, in drafting these laws; isn't that reasonable? A. I don't know; I don't think they did. They took the bull by the horns themselves.

Q. Well, it is stated in these laws that a lake to be drainable should be marshy; is it not reasonable that it is meant that it will be cheaper for all concerned, more practical, to wait until there is no question as to the marshiness of the lake, until this slough grass sod has covered the lake bed, so there is no question as to its value for fishing, boating, and until this slough grass sod has tied together this marsh? A. Well, if you wait until it gets dry you wouldn't need any ditch.

Q. Well, does a lake get dry by the time it is covered with slough grass sod? A. I have seen lakes dry up entirely.

Q. Then if we wait a few years we won't have to pay for this ditch? A. Wait a few centuries.

Q. How many centuries? A. Oh, I don't know; I am not an expert; might come some very wet seasons and run up to where it was originally.

Q. That's all. (No answer.)

Mr. Sullivan: That's all.

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THE "FARMER" PLAYS DETECTIVE. HAS OBTAINED A PRINT OF A PHOTOGRAPH TAKEN BY THE STATE'S ENGINEERS AND VIEWERS BUT NOT EXHIBITED BY THEM. PLACES THE IDENTICAL SAME PHOTOGRAPH ON EXHIBIT AND OBTAINS VALUABLE INFORMATION.

Q. Or, just a minute, Mr. Chute. In the list of expenses charged against these proceedings there is an item of three dollars paid to Mr. Manz, in Belgrade. Mr. Manz is a photographer, is he not? A. Yes sir.

Q. He took some photographs for you? A. Yes sir.

Q. Have those photographs been exhibited? A. Those are the two,—those two photographs on cardboards, there on the judge's desk. I so identified in my direct examination.

Q. These two photographs? A. Yes sir.

Q. And he took another photograph; he took three photographs, did he not? A. It is possible that he took three of them.

Q. Is this one of the photographs Mr. Manz took?

A. Well, I think it is, yes sir, although I haven't seen that before that I know of.

Q. You recognize the men who posed for that picture? A. Yes sir.

Q. It is evidently one of the photographs taken by Mr. Manz? A. Yes sir.

Q. Now then, the springs,—who are the men who appear? A. Mr. Lahr, the chairman of the County Board, and Mr. Lang, an engineer in my employ.

Q. You know then that this is one of the photographs taken by Mr. Manz to be used as an exhibit here, and has been omitted? A. That was a photograph taken by Mr. Manz.

Q. Do you know that it is a correct photograph? A. I know that it is a photograph taken there of the lake, with those gentlemen in the foreground.

Mr. Sandvig: Wish to offer this as an exhibit.

Marked for identification, Sandvig's Exhibit 7.

Q. This photograph was taken at a point south---

Mr. Sullivan: Well now if you offer it I want to see it. I just want to ask Mr. Chute a question. Scattered through apparently the surface of the water on a considerable area of that photograph, do you notice any signs of vegetation?

The witness: Yes sir, all over that.

Mr. Sullivan: It is to be seen without spectacles?

The witness: Yes sir.

Mr. Sullivan: No objections.

The Court: Received.

Q. Why was this photograph not offered with the other exhibits? A. The other photograph, we had the plates; no, I don't know, to tell you the truth, there is no reason for concealing any of these photographs.

Q. Except that this photograph shows more of the lake? A. This photograph shows more clearly all the vegetation that just reaches the top.

Q. Well, it is a partial photograph, but it is better than any of the others you have submitted. A.

That is in your judgment.

Q. Well, in anybody's judgment? A. It is a better view of the open water.

Q. It is more comprehensive, there is more of the field of the lake? A. No sir; these two show more.

Q. This photograph was taken from higher ground? A. Yes, and therefore it is not as good.

Q. Because it was taken from higher ground. You mean lower down to the surface of the water the more of the surface of the water you can see? A. I don't contend that. There is a happy medium which you want to strike and which we attempted to strike.

Q. Well, don't you know that the higher the ground the more you see of the lake? A. If that would be true, the best picture you would get would be right from the top.

Q. Certainly. A. I don't think so.

Q. If you took a picture right down from the shore you would get a distorted view as to the relative area covered with weeds and water, wouldn't you? A. I think so.

Q. From what point on the lakeshore was this photograph taken? A. That one, I don't know.

Q. It was taken from a point south of Jorgen Pierce's buildings, was it not? A. I don't know.

Q. You don't know anything about it? A. Mr. Lahr can identify it.

Q. You say that without the aid of a glass it shows more clear—what is the nature of that vegetable growth? A. I don't know; weeds that ordinarily grow in a sloughy lake, shallow lake.

Q. Is it not a field of water lilies? A. I can't state; might be; I don't know.

Q. Might be; you don't know whether it is or not? A. No.

Q. Could you as an engineer state at what elevation above the lake that was taken? A. I should judge that the camera there was about twelve feet above the lake, although I can't state; I am not a photographer.

Q. And about how far back from the shore? A. Well, perhaps a hundred feet, I should judge; it is impossible to state. I am not an expert photographer. I should judge that the camera was placed probably 75 or 100 feet back from the lake, at an elevation of ten to fifteen feet, and these two people in the foreground.

Q. And Mr. Lahr, the Chairman of the Viewers, is one of them? A. Yes sir.

Q. Thats all. (No ans.)

Mr. Sullivan: That's all.

P. N. LAHR, a witness on the part of the petitioners, was then recalled, for cross examination, and testified as follows:

Examination conducted by C. R. Sandvig:

Q. You have heard the testimony; you are one of the men posing for a picture in that picture, are you?

A. I am.

Q. That picture was taken at a point directly south of Jorgen Pierce's buildings, was it not? A. Well, there is buildings there, but I wouldn't know the name of the parties that own the buildings; south of some buildings there, yes.

Q. South of some buildings? A. Yes sir.

Q. About how far south of those buildings? A. About how far south of those buildings?

Q. Yes. A. Oh, I should judge about forty rods. That is as far as I can remember here now; I wouldn't say whether it would be a little less or a little more.

Q. These buildings are built on high ground overlooking the lake, and this is on the ground south of the buildings? A. Yes, I think so.

Q. And in the near foreground where that picture was taken there was a field of water lilies as you remember it, was there not? A. Yes; point of land running out into the lake; and the camera was on that point, shown right in there where the lake is the widest I think, water comes closest to the shore.

Q. And there was a field of water lilies in front of that camera? A. Yes, there is practically all through there, there is some of that stuff in the lake.

Q. With your knowledge of photography you expected that this view taken as if to show a goodly portion of the lake would make it appear that the lake is covered with water lilies because of the fact? A. I have no knowledge of photography; don't know nothing about it as far as that is concerned.

Q. But that view was taken in front of those water lilies? A. Well, the view was taken to get the lake as it is.

Q. With the water lilies posed in the foreground? A. Whatever there was there, yes, certainly.

Q. Do you mean to tell us all that lake is covered with water lilies? A. I don't say that.

Q. But this was posed so as to make it appear

that we have a picture of the lake and at the same time have water lilies in the foreground? (No answer.)

Q. Referring to Objectors' Exhibit No. 7, do you recognize that as a picture or series of pictures of Crow Lake? (No answer.)

Q. If you use a glass. A. In which way, if you want it to aid me.

Q. Well, if you get it posed right. A. What do you like to have me do: point out where the camera stood on this picture you showed me before?

Q. Well, if you can identify it, as to whether you can see any identification marks, any buildings or any shores that would identify it as a picture of Crow Lake? A. I think it looks like the north shore, as far as I have been, north shore of Crow Lake and across on the south.

Q. To the right of that picture you see some buildings that you referred to as being north, in this picture, Sandvig's Exhibit 7. A. Yes, I think it is.

Q. And to the left of that picture is a timber lot in which you see some buildings that you visited; did you note the buildings of Mr. Kittleson's on an occasion when Mr. Kittleson was not home but Mrs. Kittleson and undoubtedly the dog was at home? A. West?

Q. To the left, that would be the east. A. Yes.

Q. You recognize the timber lot and going up to the shore of the lake there? A. I do.

Q. As the building place that you visited on an occasion when Mr. Kittleson was not at home. There are buildings located in that timber lot, is there not? A. Well, I wouldn't say for sure.

Q. Well, after you visited George Pierce's place or after this photograph was taken south of Pierce's place, you did visit a building lot on the shores of the lake, in a timber lot further east? A. That is on the south fork; on the north shore?

Q. On the north shore of the lake; that is all the north shore. A. We may have; I wouldn't say for sure; I recollect there is some buildings there.

Q. You recognize there is a building lot right up to the lake in that timber? A. No, I don't.

Q. This is a view from the lake; was you there in the fall? A. I was.

Q. When the stacks were there? A. Well, I wouldn't recognize whose stacks they were; we saw a lot of them.

Q. Well, there was a building spot on the shore of the lake, in Kittleson's place, of natural timber,

basswood and brush? A. I think there was buildings down there; we paid no particular attention to the buildings.

Q. But you was down there? A. Yes.

Q. Then you saw those buildings; and do you remember any buildings east of Kittleson's buildings, referring to Sandvig's Exhibit 5 and 5-E? A. As to these buildings, I am not able to state much in regard to these buildings.

Q. But you remember Jorgen Pierce's buildings; this is taken from the lakefront, but it will probably aid you in identifying the place. A. No, I couldn't say.

Q. Well, without using the photograph, using your memory, you remember that you told Henry Hendrickson that you had seen this place of Mr. Sandvig, the irrigation ditches and pipes, etc? A. I did not say that I saw the irrigation.

Q. Well, you are one of the viewers, you remember. A. I remember I am one of the viewers, yes.

Q. And you remember you or one of the viewers spoke to Henry Hendrickson about having been at or near Mr. Sandvig's place and that you had seen irrigation ditches and pipes? A. I didn't say anything of the kind.

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THE "FARMER" HAS THE GANG OF CONSPIRATORS EXPOSED.—THE VIEWERS PLAINLY FRAMED UP EVIDENCE FAVORABLE TO THE DITCH AND DID NOT PERFORM THEIR DUTY ACCORDING TO OATH.

Q. Did you hear any of the other viewers say so? You remember that you saw this place on the Petitioner's Exhibit A marked Charles R. Sandvig? A. No. I did not see the place.

Q. You didn't know there was a place there? A. Well, I know there was a Sandvig living on that lake somewhere, but as far as where he was living, never been to the place.

Q. Never been to the place? A. No sir.

Q. Didn't know there was any buildings or trees there? A. I have not been on the place; I didn't know whether there was buildings or trees or bamboo poles or anything of the kind; I didn't know anything about it because I have never been to the place.

Q. Referring to petitioners' Exhibit B, I wish you would step up here. In your duties you have run up against the mistake that a lot here belonging to Sandvig is marked on the map as church property,

have you not? A. I have not. No, I won't own up to a mistake UNLESS THE COURT SAYS SO.

Q. What I mean is you have run against the fact that there is a mistake; you know of that particular mistake?

Mr. Sullivan: Well now, just a moment; what difference does it make if there was a mistake? This is a proceeding in rem.

The witness: What I want to say, I am not responsible for a clerical error in marking church property.

Q. I am not holding you responsible. A. Well, I am testifying here now; just let me get through, and when I get through you can answer. And because the engineers or whoever drew up the plat marked it church, that ain't a mistake of mine. I won't own to any mistake of that kind because it was not done by me, and I presume the land is described right, only just the name is Church showing on that plat; that is the only difference there is in it.

Q. Well, is it not a fact that because of that mistake you had to make a special trip back to the vicinity of this drainage project? A. No sir; no sir.

Q. The proceedings were held up, were they not, in order to give the viewers and engineer an opportunity to make another trip down there and make another view of this property? A. No sir.

Q. In your previous testimony you have stated you didn't know anything about buildings being located at Jorgen Pierce's place. A. I saw buildings, but I am not familiar with these names. The viewers went out there regardless of who owned the property; we took the property by description and nothing else.

Q. As viewer your duty is to see whether there will be benefits or damages, is it not? A. Certainly.

Q. And you did not fulfill your duty in going up to those properties and investigating whether this drainage system would disarrange the building plans? A. I will not own up to it unless you show me where I did not fulfill my duties.

Q. Well, you did not know Jorgen Pierce had any buildings on the lake? A. I told you that we didn't go out there according to the names; we went out there according to descriptions of lands. It is immaterial to the viewers who owns the property. On whoever's name it is we just assess accordingly, and go out there and view according to the descrip-

tion of the property. The books, the records will show who is the owner; we don't care whose name stands on a map or on a plat.

Q. But in viewing to ascertain as to whether these properties would be damaged or benefited, did you take into consideration that this drainage project would for instance disarrange my building plans, leaving my buildings instead of on the shores of the lake, on the edge of a muck hole? A. Well, If I am allowed to answer your question and ask you this question: is there any benefited lands on yours; did the viewers assess you for any benefited land?

Q. Benefited lands? A. Yes.

Q. Mr. Sullivan: I understand the record shows for added land.

The witness: Well, I mean for benefited land.

Q. Did you come to my place to see whether there would be any benefited lands? A. Because the engineers that have been around there, and they are our guides; we would never find these ditches if it hadn't been for engineers and people that's been over these grounds; and there is high bank and high shore along that side. But did you answer my question: are you assessed for any benefited lands?

Q. I don't know as I will. In spite of the fact that I have some slough land, you had been warned to let me alone. A. If you had some slough land, we would have found you.

Q. Without looking for me? A. No sir.

Q. I think that is all. (No ans.)

Mr Sullivan: That's all Mr. Lahr.

10:15 A. M. Recess of ten minutes declared.

Mr. Sandvig: I would like to give evidence, and I will try and separate evidence from the arguments as far as I can.

The Court: All right, take the witness chair.

Mr. Sandvig: And I would also say that as it will require some preparation to arrange the arguments, if it would be satisfactory about the arguments, to let Mr. Anderson bring in his cases after I have given my evidence, and let me give my arguments at some other time.

Mr. Sullivan: Well, it seems to me we ought to get at this systematically, and get this closed up.

Mr. Sandvig: Well, it is an important matter, and involves my home and my family, and it takes a little preparation

The Court: All right, we will hear you after dinner. Just take a seat, as they may wish to cross examine you.

THE "FARMER"—SCIENTIST'S CONTRIBUTION
TO AGRICULTURAL SCIENCE—IRRIGATION
WITH MUCK.

CHARLES R. SANDVIG then took the witness-stand.

Mr. Sandvig (as a witness): I wish to say that I have originated and developed a method of combining irrigation and dredging by which I dredge the muck with the water that will come with it, with what is known as a centrifugal pump, which is otherwise known as a dredging pump, and discharge this solution through pipes and ditches to the highest portions of my land from which it is utilized for irrigation purposes; in the methods known, I believe as surface irrigation, the water carrying the muck and depositing it on the soil as the water seeps in in the process of irrigation.

Paper marked for identification, Sandvig's Exhibit 8.

Mr. Sandvig (continuing): I will submit as evidence a drawing of my farm on a scale of 1-16 of an inch to the rod. This also includes a slip which is a copy of the exact shape of the added land that I would get by these proceedings, as copied from the engineer's map.

The exhibit was then shown to Mr. Sullivan.

Mr. Sullivan: No objection.

The Court: Received.

The exhibit was then shown to the Court.

Mr. Sandvig: On this map this is the location of the dredging machine. This is looking north up the line of my land. And the muck solution is pumped into one ditch, perhaps 60 feet from the muck hole, which is known as the lower ditch, a portion of which is also shown in Sandvig's Exhibit 5-B and 5-C. Aside from this being a ditch, it is also a demonstration pool about two rods wide, built up with a retaining wall, into which the muck solution was pumped to demonstrate the portion of muck that would be deposited by this process when deposited in a pond instead of distributed over the field where it is difficult to ascertain the actual amount of muck. The portion of this along the straight line northward naturally lies sloping towards the lake, and in this particular instance it slopes; there is the end of a hill jutting down here, but it slopes down to a point about five or six feet; the ditch at the lower end; this retaining wall is probably six feet; it comes up to the edge of this hill where one side is built up

and the other side is on the level with the hill, and then dips across and leaves where there is also a retaining wall, but I do not have a photograph; and then the ditch is laid out at right angles following the contour of the sloping land with sufficient fall for flowage. This is known as the lower ditch and this will irrigate all land below the lower ditch; pumping to this ditch I only pump against an actual head of about ten feet. Then there is a double pipe line of four inch pipes, 550 or 600 feet to the middle and upper ditch. The middle ditch lies alongside of the upper ditch, and this lower is built up, and I state where these ditches are built up, they are built up with muck pumped out of the lake; this portion running northwards is built up and then it turns at right angles eastward, not necessarily following the contour of the land. The red portion shows where it was built up. The contour comes in this way. The object of laying out a third ditch is, at one time it was the north boundary of my land; double row of willows and the ditch runs between the rows of willows, and from the middle ditch I irrigated all property below the middle ditch down to the lower ditch. It is desirable to irrigate as much as possible below the lower ditch in preference to the middle ditch, because the higher you pump the water the more power it requires; the pipe line may either be switched into either the middle ditch or the upper ditch. The upper ditch is built up by throwing up from the inside retaining walls or dikes, and then pumping muck through this until it is filled up. You understand where each one is red lines, the upper ditches or any of the ditches is built above the level of surrounding ground, to points shown in dark lines, as for instance here, where we have the highest point on my farm; the land then slopes back towards the lake and can be irrigated from this ditch in those directions, and also slopes northward but not gradually, crossing little hollows, a hollow here, about eleven inches at the lowest, and another hollow about the same depth, that is filled up in the same way. There is also a branch of the upper ditch going straight north except where branches or turns slightly to the eastward around a little knoll where there is located a gravel pit that is above all the branches and cannot be irrigated, containing about two-thirds of an acre, and then continues on.

Here is my building location, and here, referring to Sandvig's Exhibit 5-E, we have a view of my buildings, built as they appear from the lakeshore;

reinforced concrete buildings, built in that location because of the lake view, half a mile or approximately half a mile from the public highway which is at the opposite end of my narrow strip of property. I don't know whether it would be proper evidence to state that except for the lake I would naturally have placed my buildings at the opposite end of the property. I think that is evidence. In Sandvig's Exhibit 5-G, 5-F, 5-C, 4-B, 4-C, 4-D, we have lake views taken towards my property from the lake, from a boat in the lake, or taken of the lake, from the shore. In view, 5-D, we have a view of the lakeshore as seen from the bedroom windows during the blooming of the plums and compass cherries in spring time. The view is so taken as to show the window sash on either side. This does not represent the view that I and my family see from the bedroom window at all times. A view of the lake is not like a painting. It is changeable; it changes with the seasons; it changes with the shades of light, as for instance with sunrise, mid-noon, sunset, and the various shades of moonlight. (Witness resumes the witness-chair.)

By this process of combining dredging and irrigation there are several benefits, in one simple operation. The lake is improved by reason of the muck being removed. This muck, as has been testified—it is sometimes hard to separate evidence from arguments,—this muck is evidently, according to my investigations and observations, decayed vegetation and valuable as a fertilizer. By this process of dredging and irrigating this muck, which is a valuable fertilizer, is deposited on the land to enrich the land. By the same operation there is the usual benefits of irrigation. A peculiar point in this process is that on sandy soils such as we have, referring to Sandvig's Exhibit 3 (witness showing the court some muck); it is my conclusion from careful observations and consideration of the point that as an irrigation proposition it is cheaper to irrigate with a muck solution than it would be with clear water.

Mr. Sullivan: Than it would be with what?

Mr. Sandvig: It is cheaper to irrigate with a muck solution than it would be with clear water. Necessarily it cannot be claimed that a pump has a greater efficiency as to gallons in pumping muck solution, and it must be conceded that a dredging operation however simple adds slightly to the cost of the operation. At the same time, by reason of the fact that our soil is sandy and porous, the

muck solution will according to my experiments flow much further and be more effective by reason of the fact that the muck in the solution to some extent closes up the porous soil. It is my conclusions, therefore, that ten acres could be irrigated cheaper and more effectively with so much less muck solution than it would be cheaper and more effective to irrigate with muck solution than it would be with clear water. As a fertilization scheme there is nothing, no method known to agricultural science that approaches it. Muck has been used as a fertilizer in parts of the United States, according to the United States Department of Agriculture, since the period of the Civil War. It has been used in other countries as a fertilizer for periods unknown to myself, probably unknown in history. The methods have been crude, expensive, cumbersome, difficult. Muck as a fertilizer compared with barnyard manures has been claimed by some who have conducted field experiments to be more valuable in the long run than barnyard manure. Applied directly on the scil there is this difference; barnyard manure applied thinly with a manure spreader, dragged in, is more effective immediately for the first crop or the first succeeding crop. The effects of the muck is not so apparent for the first crop as barnyard manure, but is effective after the appearances of the effect of the barnyard manure has disappeared. Doctor Alway, Chief of Division of Soils, of the University of Minnesota, who has seen this muck but did not analyze it, stated that in his opinion—

Mr. Sullivan: Well now, just a moment, Mr. Sandvig. I think, your Honor please, I shall object to quotations from this Doctor Alway going into record, as not the best evidence of that man's opinion as an expert.

The Court: Of course, it would be hearsay, you know, under the rule.

Mr Sullivan: I move that part may be stricken.

The Court: You may give us your opinion.

Mr. Sandvig: You mean to object to any reference to Doctor Alway's opinion?

The Court: Yes, the law would require Doctor Alway to come here and testify himself.

Mr. Sandvig: I will submit without objection, because I was simply trying to quote authority which was not as good as my personal experiments. As to the extent of the operation compared with hauling manure, I cannot state from my own experience what the cost of hauling manure with a manure spreader

will be. My property is located about a mile and a mile and a half according to which end of it you go to, from the Village of Belgrade, and I have had some experience in hauling manure from the Village of Belgrade, and the best that I could do was to haul about four loads a day. I will not state just how many hours that took; it is possible that sometime was taken up in the chores in the morning, but it is my conclusions that three loads a day was usually pretty good, but sometimes four a day which was the best. The pumping operations as stated were originated and developed by myself. I can pump muck out faster and more efficiently, at less cost today than I could in 1909. My present outfit (showing the Court an exhibit) referring to Sandvig's Exhibit 4-A, is a picture of the last pump boat design as it appears when being pulled out of the waters of the lake at the approach of freezing weather. It is, as seen in the exhibit, so designed, containing a seven-horse kerosene engine and number three and a half centrifugal pump and perhaps more than one ton of reinforced concrete ballast; it is easily pulled out on shore by hand with the aid of a fence stretcher.

Mr. Sullivan: With the aid of what?

Mr. Sandvig: With the aid of a fence stretcher.

Mr. Sullivan: Oh, a fence stretcher.

Mr. Sandvig: Rollers being used underneath between the bottom of the boat and timbers; as seen in exhibit, it is not a complicated arrangement. The engine used is a kerosene internal combustion engine, centrifugal pump, No. 3 $\frac{1}{2}$. There are different makes of centrifugal pumps. There is a great difference in the efficiency of different makes. I would not state that any make of a centrifugal pump would have the same efficiency. At the same time it would seem to me as a personal or an advertising scheme to name this particular make of pump. I have tried other makes of pumps which did not claim and apparently did not have the same efficiency. In this particular make of pump the impeller of the pump had to be modified to adapt it for pumping muck. The modifications were simple and in my opinion would not affect to any appreciable degree the efficiency of the pump, but adapted it for pumping weeds, roots, moss, bull-heads, clam shells, or anything except solid stones above a certain size, without clogging up the center of the impeller. A centrifugal pump is an exceedingly simple machine which may be described as somewhat similar to the blower on a threshing machine. The difference con-

sists in,—that the centrifugal pump by the same law of physics pumps water as a blower on a threshing machine blows wind. It is necessarily made with a much smaller impeller than a blower because of the greater weight of water than wind, but otherwise the laws, the principle of its construction are identical. There is no valves as we have in other pumps. As a blower on a threshing machine will not only blow wind, but will with the wind, take straw, sometimes cynder teeth, and on some occasions perhaps pitch forks, or particles, broken particles of the machine, and fan them out through the blower,—on the same principle,—a centrifugal pump will not only pump water but will with the water take muck in suspension, or sand, stones within the limitations of the construction of the pump, roots, weeds, bull-heads, most anything you can imagine. The impeller is connected on one end of a shaft to the other end of which is a pulley. The whole machine consists of this single running part. There is but the one running part to wear and get out of order. Compared with other farm machines it is almost as simple as a plow; it is many times more simple, in fact as to simplicity would have no comparison with a manure spreader. The cost of operating this outfit on ten cent a gallon kerosene including other oils, but not necessarily including repairs which have been few and are difficult to estimate, would be within perhaps a dollar a ten hour day. The capacity of this outfit is rated at 370 gallons per minute; figuring that the elevation against which,—the total elevation against which—

Mr. Sulilvan: Pardon me, Mr. Sandvig, you said 370 gallons,—I didn't catch, per what?

The Court: Per minute.

Mr. Sandvig: Per minute, figuring a total elevation including necessarily the actual elevation plus all friction in pipes, suction and discharge, of forty feet, total elevation of forty feet, requiring six and five-tenths horse-power. The actual elevation to which my longest lines of pipes discharge is about twenty feet. The power required for pumping to a total elevation of twenty feet would be only 3.49. To be fair I have allowed a friction resistance equal to the total elevation. In pumping to the lower ditch and somewhat to the middle ditch the discharge could be made greater or the power required would be considerably less. Its capacity as I have figured it would amount to in the neighborhood of 900 tons of muck solution for ten hours. The weight of gallons

is sometimes given in round numbers and sometimes in decimals. In decimals an American gallon contains 231 cubic inches, weighs 8.3356. If you find my total to be incorrect, kindly call my attention to it. It is difficult to state just what proportion of this is muck. I do not consider it very important by reason of the enormous amount of water that vegetation or plants or fruits require during the year. I think the muck will be quite sufficient, whatever the proportion. In dredging operations it is figured that they dredge from ten to forty percent of solids, that is in dredging operations conducted in muck or sand or clay or blue clay. It is my opinion that there is no substance that is easier to mix into a solution and pump than this decayed vegetation we call muck. It mixes very readily with the water. It does not settle rapidly. There is no difficulty with its settling in the pipes as would be the case with sand. There is no difficulty in its sticking as would be the case with clay. All conditions seem particularly favorable to this kind of an operation. If it is figured in suction dredging operations to pump from ten to forty percent of muck or soids, it would seem a much greater percent could be taken of solids in operating in muck; but I do not consider it desirable to pump the solution of such a consistency as to be too decidedly sluggish. To be fair, as a matter of fact I cannot state mathematically; it varies; but I should say perhaps ten percent. Exhibits B and C will indicate the volume of muck; at ten percent in a ten hour day there would be at an operating expense of one dollar, plus labor, and repairs not included,—labor of one man,—approximately 90 ton of muck, not counting the water used as a carrier in the operation and for irrigation purposes. Ninety ton of muck compared with four loads of manure shows decidedly a margin in favor of fertilizing land with muck. At the same time it must be considered that there are benefits derived from this operation as irrigation, as beautifying the lake and improving the lake as to beauty, improving the water front, improving the lake as to fish supply. I will omit the supply in this instance. And boating and ice. In my own operations,—I will strike that out, and begin at another point. In developing this process as may be expected I have been up against some new problems. I did not invent the centrifugal pump. I did not originate dredging with the centrifugal pump. But when I informed the manufacturers of my first pump that I had successfully pumped

muck solution with a No. 3 pump, they simply did not seem to think, in fact stated that they did not know that it was practical to dredge successfully with such a small pump. Compared with other pumps, a No. 3 centrifugal pump, having a capacity of 360 gallons per minute, would of course be a very large pump. Compared with centrifugal pumps of other sizes, I believe a No. 20 pump is the standard size for dredging purposes. I do not have the figures here of the capacity of the No. 20 pump, but a No. 18 pump would have a capacity of 10,500 gallons per minute, as compared with 260 gallons, the No 3 pump. The larger the pump necessarily—

Mr. Sullivan: If the Court please, I just want to interrupt for the information of Mr. Chute, the engineer. What was the diameter of your intake pump pipe, this one you have been describing with a capacity of 370 gallons a minute, what is the diameter of your intake pipe? (Handing a catalog to Mr. Chute, seated nearby.)

Mr. Sandvig: No. 3.

Mr. Sullivan: No. 3½.

Mr. Sandvig: No. 3½ has 370 gallons capacity.

Mr. Sullivan: Well, what is the diameter of the pipe which has a capacity of 370 gallons a minute and which pumps 900 tons in ten hours?

Mr. Sandvig: Mr. Chute has that.

Mr. Sullivan: You said you had a seven-horse internal combustion engine in which you used kerosene?

Mr. Sandvig: Yes sir.

Mr. Sullivan: And assume that to be ten cents a gallon?

Mr. Sandvig: Yes sir.

Mr. Sullivan: And the actual horse-power was 6.5?

Mr. Sandvig: Yes sir, according to the laboratory tests.

Mr. Sullivan: And you raised that 900 ton of muck solution in ten hours with that horsepower and that kind of pump to an elevation of forty feet; am I quoting you correctly?

Mr. Sandvig: Yes sir. Necessarily the larger the pump the less difficulty in dredging operations.

Mr. Sullivan: Just one moment; if I might ask you; the suction of intake pipe you have there now in actual use, what is the diameter of that?

Mr. Sandvig: Five inches, I think.

Mr. Sullivan: Is that the one that did this work, or was it a smaller one?

Mr. Sandvig: That is the one I described as the pump I am now using.

Mr. Sullivan: And that did this work?

Mr. Sandvig: Yes sir. With the very small pump there were principally two difficulties: obtaining a continuous supply of muck and screening out stones of an objectional size. Obtaining a continuous supply of muck was a gradual development of an arrangement of extending and swinging the intake pipe. Screening out stones of an objectionable size was a difficulty not over come until I discovered the very simple principle that gravity would not only separate stones of objectionable size but all stones, and even fine grains of sand that would readily pass through the pump but would neither do the pump nor the land any good. Separating stones and sand from the solution by gravity simply consists in placing between the intake pipe and the pump a box which may be simply a home made dry-goods box, forming an enlargement of the pipe. The solution in passing through this box is checked in its velocity, and as a result either sand or stones will fall by gravity to the bottom of the settling box.

Paper marked for identification, Sandvig's Exhibit 9, and shown to the Court.

Mr. Sandvig: The result is that no stone of an objectionable size and but very little, very fine sand has ever passed through this settling box into or through the pump. The sand and gravel or stones are separated and deposited on the bottom of this box in such a condition that it would be,—apparently be fit for making concrete blocks; while the muck, weeds, roots, etc., pass right on to and through the pump. By this arrangement I have pumped muck as successfully with a No. 1½ pump as might perhaps be done with the large dredging pumps. The extensions of the pipes consists in laying a pipe on the lake bed from the settling box to any desired point in the lake. This is referred to as the permanent portion of the suction pipe. It can of course at any time be extended to any new point in the lake. Connected to the far end of this portion of the suction pipe, with what we may describe as a double elbow, is another suspended portion of the suction pipe. This suspended portion of the suction pipe is designed to swing with the double elbows, or with the nipple between the double elbows, as a sort of pivot. This is suspended between the bottom and the surface of the lake, not dragging on the bottom, not coming to the surface, lest any pipes would take

in air. To the end of the suspended portion of the intake pipe is a short section of pipe attached with an elbow as shown in drawing, Sandvig's Exhibit 9, and also shown in photograph on Sandvig's Exhibit 4-C, in which it is lifted out of the water for the purpose of showing its position; in operation this point is let down to the bottom of the muck, adjusted to the bottom of the muck as shown in figure, the next below, 4-D. This end of the suspended intake pipe, with this end of the suspended suction pipe that attached intake pipe is suspended below the bottom of the boat in which the operator sits; the intake pipe is let down to the bottom of the muck; with a long handled mortar mixer's hoe, the muck is loosened up and sucked away; when sufficiently cleared here at one point the boat is simply pushed forward a little which pushes forward the intake submerged pipe in a circle about the end of the permanent suction pipe. When a complete circle has been described with this operation, a five foot section is inserted in the suspended portion of the intake pipe or suction pipe, with the result that the operation is repeated five feet further out from the hub of the circle. The last extension used in operations in 1917 placed the intake pipe at a distance of 85 feet from the hub of the circle; in other words, a hole was dredged in the lake 170 feet in diameter, as the figures give there on the drawing. Still, by reason of my many duties in building up a new home, requiring the building of buildings done by my own hands, I did not in 1917 pump as much as the season required. The improvement to the lake, however, was sufficient so that all industries in Belgrade as well as farmers could take all the clear ice they desired, and in my estimation there was as much or more left as what they took. In a season of low water in this or any mud lake the ice would be clearer and purer by reason of the fact that the surface vegetation of the last years is removed. Another advantage may be derived in the fact that by this process a mud lake may be improved for supplying ice harvest at any convenient point where the muck is sufficiently deep. On Sandvig's 4-E is shown the discharge of the two pipe lines; 4-E; the next one is 4-F.

The Court: Yes, that I presume shows the irrigation ditches?

Mr. Sandvig: Shows the distribution of muck solution in the process of surface irrigation. 4-G is a photograph taken of the muck deposits after one

irrigation operation, taken the day after irrigating when the muck with the water seeping away from it shrinks, cracks up into squares and blocks after which it gradually disintegrates until it is incorporated completely and lost sight of in the soil. 4-H is a view in which the lower ditch is hardly if at all visible, though located in the mid or near foreground, showing a heavy vigorous growth of raspberries on poor sandy soil, where not only the fruit but the new growth of plants and possibly the whole stand would have suffered severely from such a season as 1917 in which the photograph was taken. The next is 4-I, is an ice scene, harvesting ice from the improved portion of the lake. Referring to the opposite side, referring to Sandvig's Exhibit 5-A, is an experiment to determine the origin of muck; a slip of plant, such as the photograph, the name of which I cannot give, was cut on the approach of frost from a house plant which had been growing in open ground during the summer. The slip was an ordinary slip, perhaps four or five inches long, set into a glass of well water which is probably of the same kind of water as the spring water feeding Crow Lake springs. No soil was ever added to this water. More and more well water was added as it dried up, or was absorbed by the plant. I noticed by examination during the process of the experiment that the glass became discolored, translucent; the water was apparently quite clear. In the latter part of the winter a slip was cut from this plant, which had developed branches and root system in clear well water, and stuck into a pot of soil. And the potted plant is a photograph of the plant developed from this slip which has, however, developed in water, vitality enough to root itself into soil.

12 M. Noon recess. Afternoon session, 2 P. M.

Mr. Sandvig (continuing): The photograph of the plant suspended above the glass is the plant developed entirely in water, photographed about February. It would seem apparent with this experiment that plants, some plants, some species of plants are capable of taking plant food from water and air. It would also seem apparent by this experiment that in the process of decaying this would build up muck.

Mr. Sullivan: Now, your Honor please, without interrupting Mr. Sandvig, I guess it is not seriously disputed but what some plants do derive sustenance from air and water; certain plants do take nutriment from the air and water.

Mr. Sandvig: Well, that is a point your side have testified to, but I just furnished the evidence; it is already testified to by your expert testimony.

THE LAWYER EXPOSES HIS OWN TRICKERY AND INCONSISTENCY. HAVING AT THE BEGINNING TRIED TO CONFUSE AND EMBARRASS THE "FARMER" BY OBJECTING TO HIM REVIEWING THE POINTS ON WHICH HE WISHED TO AGREE WITH THE EVIDENCE SUBMITTED BY THE PETITIONERS, HE HIMSELF NOW BUTS IN ON IDENTICALLY THE SAME POINT—TO STATE THAT THEY AGREE WITH THE EVIDENCE TO WHICH THE "FARMER" FURNISHES PROOF.

Mr. Sullivan: I think that was admitted, practically.

Thereupon, at the request of the witness, the last sentence of Mr. Sandvig's testimony was read by the reporter: "It would also seem apparent by this experiment that in the process of decaying this would build up."

Mr. Sandvig: Vegetable matter from clear water; and applying this to Crow Lake, with its vegetable growth, it seems it is provided by a law of nature a wise and beneficial law of nature, that the plant growth in this lake is taking from the spring water that percolates up from the gravel beds beneath the hills, plant food, and in the process of decay of these plants, deposits this vegetable matter as muck on the lake bed, which can economically be pumped to the poor gravel soils by the methods originated and developed by myself. Referring again in this connection to Sandvig's Exhibit 2, which is a two-quart jar full of this Crow Lake muck, this jar filled to the brim with Crow Lake muck weighed at the time of filling four pounds six ounces. The same jar filled to the brim with lake water at the same temperature weighed four pounds and two ounces. The muck would therefore weigh only about eight ounces per gallon more than water. This also proves how readily this decayed vegetation will lend itself to being pumped in the manner described. Referring to Sandvig's Exhibit 4-H is a photograph of two lots of potatoes raised each lot from nineteen hills the season of 1917; the lot to the right was produced on clover sod, well covered with barnyard manure dragged in after being applied, but was not irrigated and on ground that had not previously

been irrigated. The lot from nineteen hills of potatoes under these conditions weighed at the time of being dug six pounds and one ounce. The lot to the left were raised on ground previously irrigated with muck solution and irrigated during the season of 1917 with muck solution and the potatoes from nineteen hills raised under these conditions weighed at the time of being dug thirty-one pounds and four ounces. The benefit of this method of pumping muck solution for irrigation purposes, which methods have now been perfected and can be inaugurated by anyone under similar conditions, is that the lake as a supply for pumping muck solution on my farm is worth more to me in an agricultural way for increasing crop production than the added land would be or could be. Referring to Sandvig's Exhibit 5-I, we have a photograph of a glimpse of the lower ditch as it winds around my house. By reason of my many duties as stated before, the season of 1917, we did not get the water through this lower ditch, this being a new arrangement, until the plums in the orchard had commenced to shrivel up and drop badly. The grass was turning pale. When we got the water through, the grass freshened up immediately. The immediate result on the plums was more rapid dropping for a short time, when the plums which were still alive freshened up and developed a nice harvest of plums. My little farm, which as a matter of fact has proved more than I can take care of, for the purposes it is farmed, tree, fruit, garden truck, and small fruits, could not be operated as such if the source of supply of lake muck were removed. I also wish to state that in our reinforced concrete house, with full reinforced concrete basement and concrete floor, we have in the basement a well with as good drinking water as I have tasted in my travels half way around the world. It is a well known fact and has been demonstrated within a mile of my own home, that for some reason a pipe driven down a few feet below the surface of the water will yield a bad tasting water, depositing a sort of dirty, rusty deposit in a vessel in which it is contained. It is probable if this ditch is established as laid out, within a short distance of my home, that the well, which could not under the conditions easily be made deeper, would dry up, and that under whatsoever conditions we would renew it we would come to that strata of bad tasting rusty water. The value of good drinking water is an asset to a family which cannot be stated

in dollars and cents. I also wish to state that I have not been selfish with the valuable methods developed by myself, and will submit as evidence (marked for identification Sandvig's Exhibit 10) the copy of a talk describing my methods before the convention of the Minnesota State Horticultural Society in December of 1911. It is printed in the Horticulturist of April, 1912.

Mr. Sullivan: That is objected to as incompetent and not the best evidence.

Mr. Sandvig: I gave the talk myself.

Mr. Sullivan: His talk in there isn't any better than anybody else's talk. The article in the Minnesota Horticulturist is not competent evidence, I submit to the Court.

The Court: No doubt about that; it is not competent.

Mr. Sandvig: The publication is a State publication published by State funds appropriated by the Legislature from year to year.

Mr. Sullivan: I understand the ruling of the Court is that the objection is sustained.

The Court: It is not admissible in evidence.

Mr. Sandvig: Under time and date, ten a. m., November 23rd, 1916, File No. F. A., I received a communication from the office of Public Roads and Rural Engineering, United States Department of Agriculture, in which they stated—

Mr. Sullivan: Well, now, just a moment; I object to his quoting from any such communication, as incompetent and not the best evidence.

Mr. Sandvig: I have promised the United States Department of Agriculture, who have applied to me for permission to investigate these methods—

Mr. Sullivan: Well now, just a moment.

Mr. Sandvig: In behalf of the United States Department of Agriculture, to defend this—

Mr. Sullivan: Just a moment, I move this be stricken from the record as incompetent evidence; his application to the Department and whatever the response; whatever that is, I move it be stricken out.

The Court: That may be stricken; that is incompetent.

Mr. Sandvig: What is the Court's ruling as to what would be a competent way?

The Court: Well, as to your communications to and from the Department of Agriculture, that is entirely immaterial in this case.

Mr. Sandvig: May be material in evidence under the present conditions.

The Court: Well, of course you may think so, but there are rules of law that govern what is admissible and what is not, and you have to go by those when you are in a court.

Mr. Sandvig: It has been my observation that in the early days of my recollection having been born in the vicinity of Crow Lake, we did not suffer from the so-called dry winds or hot winds as we have of late years. Apparently the more lakes and swamps provided by nature to equalize the temperature and provide moisture have been drained, the more effective and pernicious have become the so-called hot winds in destroying or stunting crops. It is a law of nature that the atmosphere in passing over the ocean will absorb only a certain amount of moisture in proportion to the atmosphere at ocean temperature; the ocean temperature is lower than land temperature; as the atmosphere sweeps in from the ocean over the land the temperature is raised. It is then capable of absorbing more moisture if there is inland lakes to absorb from; if there is not, it becomes what is called a dry atmosphere and will not give up any of its moisture in the form of humidity, dew or rain, except it is again reduced to ocean temperature or unless it again absorbs more moisture from inland lakes. Inland lakes are a requirement provided by nature for maintaining humidity, dew and water supply. I will recall Mr. Chute. I think I am done.

The Court: Cross examine.

Cross Examination.

By Mr. Sullivan:

Q. Well, just a minute, Mr. Sandvig. How many acres of land are there in this farm of yours? A. Thirty-three acres and some fraction.

Q. The past season of 1917 how have you utilized that? How has your farming or your gardening or whatever you do there been distributed by you? How much of the different varieties have you had; how many acres? A. The south nine acres, except for a slough covering perhaps three acres, is planted to,—I wonder if I have any figures on any of those exhibits. (Witness refers to a paper.) About 300 plum trees and compass cherry trees.

Q. Well, proceed, if you please, and tell us what the balance is. A. Perhaps an acre of raspberries, and perhaps about two acres devoted to strawberries and garden, with good protection of windbreaks around the buildings on the entire west line and also on the north line, and three and four rows of wind-

break trees; with two rows of apple trees, each row about one hundred rods long; the balance was planted to timothy and clover, alfalfa, corn, fodder corn and beans.

Q. How much timothy and clover, how many acres? A. Counting what is between the rows of apple trees, I would say about seven acres.

Q. How long has that been seeded; how long have you had a catch of alfalfa? A. Alfalfa was planted last spring.

Q. How many acres of alfalfa? A. I think about three acres.

Q. How many acres of beans? A. I should say about an acre.

Q. How about potatoes? A. Some potatoes were included in what I have referred to as garden, and potatoes and corn on the north lot perhaps about three acres. Those are rough estimates, and I don't know how they will compare as to the total.

Q. For how many years have you been using this muck as a fertilizer? A. It would be my recollection that I first started to pump in 1908.

Q. Have you been using it continuously ever since? A. In my case it would be difficult to distinguish between using and experimenting. I know in the first years my raspberries and strawberries often suffered badly while I had some portion of the pumping arrangement pulled out, to build it over again; but I was using it or experimenting with it or working it out during those years; I have used four pumps of different makes and sizes that I have purchased, besides one engine hired at times for the first season.

Q. This past season of 1917 how many acres of your tract of land there did you top-dress with this muck as a fertilizer? A. The land lying below, referring to Exhibit,—Sandvig's Exhibit 8, the land lying below the middle and lower ditch, and the apple trees on the west side.

Q. Give us the approximate acreage. A. And also laid out and run the water for the first time through the upper ditch which had been constructed but had not been used before because of the wet seasons.

Q. Will you please give me the approximate acreage last season that you used this fertilizer upon as a top dressing, this muck or fertilizer? A. I should say perhaps twelve acres, and not taking into consideration that the upper ditch which has meant a considerable outlay of work was put into commis-

sion, but I can't say that I done any irrigating from it.

Q. Well, do I understand your answer then to be twelve acres? A. Twelve acres, plus.

Q. Plus what? A. The putting into practical use throughout its length the upper ditch.

Q. What was the nature of the crop or fruit or whatever it was that was raised on this twelve acres you speak of? A. Plums, compass cherries, strawberries, raspberries, tomatoes; and the apple trees are in a state of development just beginning to bear, so the crop is not a consideration.

Q. When this muck and water is pumped up do I understand you to say that you let it into some kind of a settling tank, or you simply distribute it into those ditches and allow it to flow off; is that right? Which is it? A. Your question covers two questions.

Q. I will divide it so you will understand. I want to know whether when you pump that up you let it into some kind of a big basin where it settles, or whether you distribute it through pipes down along those ditches and allow it to flow off? How do you handle it. A. Well, the question is the same; I will answer it in part of my demonstrations referring to Exhibit 5-B and 5-C, the muck was run through a pond for the purpose of letting it deposit its muck in the pond, as a demonstration of the quantity of muck carried by the water; also in constructing the upper ditches intended as being above the level of the ground, the ditches having been constructed by throwing from the inside outward, building up the bank the muck was run through.

Q. Run through those ditches? A. Through those ditches until the muck had settled; building ditches up with muck has involved considerable work and did involve considerable additional work in 1917, which was completed, but in the simple operation of irrigation it is decidedly not desirable to run the muck solution through any kind of a settling basin.

Q. What is the distance between your ditches, ordinarily? A. You mean in the process of irrigation, the distribution ditches.

Q. The distributing ditches, what is the distance between them? A. Well, in irrigating potatoes we plowed a furrow with a shovel plow; unless the cultivator has left it in proper condition between each row, ditches run down between each row; strawberries, raspberries the same; tomatoes in the early part of the season the same, allowing it to spread

out; practically the same in all garden stuff, allowing it to spread out so as to cover the ground more or less.

Q. Well, it spreads just as far as the water will carry it, is that it? A. The muck?

Q. Yes. A. As I have observed it both on cultivated ground and in the pasture I find deposits of muck after the irrigating just as far as I find evidence of the water having been distributed.

Q. Well, it won't distribute itself in that way to any particular diameter of muck, will it? By that I mean any considerable diameter, four or five inches; there would be simply a thin trace, wouldn't there? A. Depth you mean; well, it depends on the time of pumping the muck that you pump will be distributed,—the muck that you pump during a given time will be distributed some way between the outlet of the pipe and the area irrigated; in building up the ditches some of it will keep on depositing, will continue to be deposited in the ditches until the ditches have been built up so high that the water will carry as much as it contains.

Q. What is the diameter of that discharge pipe you have there? A. Well, it is really a double discharge pipe by reason of the fact that I could obtain four inch boiler flues as scrap iron, entirely serviceable for the purpose, very much cheaper than standard pipe.

Q. I don't care anything about that; what is the diameter of the discharge pipe? A. The two lines of pipes are each four inch boiler flues, which has a slightly less diameter than the four inch standard pipe.

Q. Well, do you have a discharge from both pipes at the same time? A. At the same time, the entire discharge is divided between the two pipes.

Q. Well then the discharge from those two pipes would exceed the diameter of your intake pipe, would it? A. Well, I should hope so.

Q. It does so, doesn't it? A. The intake pipe is five inches. A four inch boiler flue represents four inches from outside to outside of the pipe. It is not a standard pipe. I would say that it has an inside diameter of about three and three-quarters inches.

Q. Three and three-quarters; that would be seven and a half total diameter of your discharge pipes; is that right? A. Well, you wouldn't have the area of a seven and a half inch pipe by any means.

Q. Well, what would you figure the area to be? A. Well, I think your engineers can figure that out.

Q. Well, you are quite an engineer yourself; can't you figure it out? Well, without giving the totals, it would be greater than five inches, wouldn't it? A. Well, that is a technical question that can easily be determined, and I might make a mistake in answering off hand. I think your engineers can figure, but I should hope it would do.

Q. Are these two discharge pipes movable so that you can move them from one place to another? A. Well, to perhaps a greater extent than standard pipe they can be; of course, any pipes can be moved.

Q. What I mean. A. But they are not laid down to be moved around, for the purpose of irrigation, when the pipes are used to the upper ditch the water flows through the pipes and through the upper ditch to any portion of the land.

Q. Now, have you noticed there that you can raise better crops than your neighbors? A. How is that?

Q. Do you claim you are raising better crops than your neighbors? A. Than my neighbors?

Q. Yes. A. Well, I am raising what my neighbors cannot raise at all; in the dry season, my neighbors fail entirely on tomatoes.

Q. Your neighbors do not make any specialty of garden stuff, do they? A. Well, it is a tendency to specializing; it is probably less gardens raised there today, in spite of the fact that country people like garden stuff better than they used to, than there were say fifteen to twenty years ago by reason of the many failures in garden truck in that kind of soil by reason of drouth.

Q. So far as garden water is concerned for garden purposes, it would be practical to have a well and windmill and you could pipe water for garden purposes, couldn't you? A. Well water would be objectionable for two reasons. In the first place it is cold; it would require expensive equipment to have it warmed sufficiently so that it would not actually harm garden truck by reason of its being cold. For another reason, this kind of soil washes badly. It is too thin as it is. Turning clear water into a dust mulch will wash that dust mulch from the higher to the lower ground. The muck solution is charged with all the muck that it is capable of carrying, and as it seeps into this soil it deposits its muck from the place where it starts as far as it goes.

Q. The effect of your pumping and dredging operations has been to take the muck out of a considerable area, that is where they had been cutting ice you

say; is that right? A. I have dredged in my experimental work, I might say that the first year of actual right down pumping I done with the perfected outfit was last season. It is the same outfit I had perfected and put in commission the season before, but the season before was a very wet season. I have done more or less pumping during all the years I have been perfecting these methods, but had to a considerable extent covered the same ground, by reason of the fact that the muck drifts in and by reason of the fact that I believe I have given in direct testimony that in the spring time of the year when the frozen muck deposits in shallow water along any bay floats to the surface and can be moved as ice floats; I take advantage of the winds and jerk loose these floats allowing them to drift with the wind to where I have pumped, where they fill up again. The area cleared up in my operations last summer was a circle about 170 in diameter.

Q. Now, Mr. Sandvig, if this lake were drained, that is the water taken out of there in the manner described here by Mr. Chute, the engineer, by a ditch on the level, you wouldn't expect any considerable portion of that muck to be taken out of that lake by and through the waters of the ditch, would you? A. You mean by sides sliding down into the ditch and washing out?

Q. And going out this ditch is on the level, and there wouldn't be any considerable quantity of that muck leave the lake, would there? I don't say there wouldn't be any, but there wouldn't be any to speak of. A. My experience with that muck has been decidedly that it moves every time with the water; it adapts itself very readily to flowing with the water. In pumping through my pump it is sucked directly into the intake pipe; it is churned up by the impeller of the pump.

Q. That is because you have a suction, isn't it? A. I operate the intake for the purpose of taking in.

Q. I say there is suction there? A. There is a suction.

Q. Now, you wouldn't expect to find any suction of that kind in this ditch as the water would settle, would you? A. Well, I can see that it is a proposition that might have some comparison. It is on a big scale in a different way. It is possible in case of a wet season immediately after the ditch being dug or while it is being dug and perhaps within a few years afterwards that an enormous amount of this muck would wash down through the ditch.

Should we have a period of abnormally dry years with practically no rainfall it is still my opinion with my experience that that muck is decidedly,—that it lends itself very readily to being moved by water; and if the Court will permit I would like to add another experiment of mine; would it be in order here?

Q. Now, just a moment please; answer my questions on cross examination. A. It has a bearing on your question.

The Court: Now, I understood your testimony on direct to be that you stood in a boat all day or had somebody standing in a boat all day, and with a rake agitate this muck, did you?

The Witness: Well, that is not quite the description. I do not desire to agitate it. It would probably amount to the same thing in your estimation.

Q. Suppose you tell us what you did do. A. Wait a minute; I will try and answer the Judge's question.

Q. Very well. A. The intake pipe is run down to the bottom of the muck layer, not necessarily down into the gravel or blue clay. The muck as long as it is supported by the pressure of the water does not cave in as it does when it is lifted above the surface. You can take a pointed shovel and lift up to the surface what would make a very big scoop shovel full. As soon as it is raised above the surface it runs off. It is necessary to start it, and I use a long handled mortar-mixer's hoe and reach out and just pry it down so as to start it, not desiring to agitate it; in fact I consider I do the best work when I keep the intake point so clear that I can see it.

Q. Well then you do stir up to a certain extent around about your intake pipe, don't you? A. To a certain extent.

Q. The Court is correct when he says you did testify here you had a man in a boat with a rake doing that very thing? A. To loosen it up?

Q. Yes, that is true? A. Yes.

Q. Now then, suppose this ditch is dug and there isn't anybody stirring it up, as the water gradually recedes out of the lake won't this muck and stuff that is there gradually settle down? A. Well, I tried to answer that question by my experiment.

THE LAWYER HAVING RUN INTO A HORNETS' NEST OF FACTS DEMANDS OPINIONS RATHER THAN PROOF. THE "FARMER" GIVES HIM BOTH.

Q. Well, give us a straight answer. What do you

think about that? Yes or no. I am asking for your opinion now. A. Yes, I understand; my opinion certainly is that if it is required that the ditch be level for three miles lengthwise it would have to be level almost to the same extent sideways.

Q. That ain't what I asked you. Now, get your head down to my question. Assuming that this ditch is dug the way it is proposed here,—you have heard the description of it; as that water recedes, in your opinion will that muck and stuff settle down there, or float off in the ditch? Which will it do? A. It is my opinion that the weight of the entire banks will cave right down into the ditch.

Q. What is your opinion, assuming that the ditch is dug on a level there, as to this muck; will it be carried off, this valuable fertilizer, into the ditch out of the lake, or will it settle down and stay there? A. In my opinion the banks will cave into the ditch, and then if there is considerable rainfall it will of course wash over the top of the filled-in ditch.

The Court: Well, I understood that no ditch would be put into that lake until the lake water was practically drained off.

Q. Yes, you heard there wasn't any ditch going to be dug back of station 90 until 1920? A. Yes.

Q. If the water is drained off and there isn't any ditch there at all, that stuff will all settle down? A. There is nothing I know of that dries so slow,—as slow as muck.

Q. Well, if the water is drained off it will have to stay there, won't it? A. Well, I conducted an experiment.

Q. Well, never mind your experiment now. Where would it go to? Why don't it stay there? A. If there is a retaining dam put in there?

Q. I don't put in any retaining dam; I just take it as it is on these specifications, and give me your opinion as to what will happen to the deposit under those conditions. A. If only the water is withdrawn the muck will be left just about as it is, except that in the east end where the level of subterranean water is perhaps slightly lower than the present level of the lake, the muck would dry on the immediate surface but remain wet underneath.

Q. Well now, if it is muck you want and it stays there and the lake is dried out, you could go down there with a horse and wagon and shovel it out, couldn't you? A. I could probably with a team of horses haul as much as ten loads a day with harder

work than is required to pump ninety tons plus, including the muck, about 900 tons of muck solution.

Q. Well, you could have a continuous source of fertilizer there that you could go and get it with a horse and wagon, wouldn't you? A. With prohibitive labor.

Q. You call it prohibitive labor where a farmer goes and hauls manure from his barnyard? A. On that poor soil.

Q. Well now, you answer my question; you call it prohibitive labor for a farmer to go and haul barnyard manure out on to his farm? A. On that poor soil I don't know farmers making very much of a dividend and keeping up the fertility of their soil.

Q. Well, you know that every farmer that is worthy of the name hauls out the manure on his farm doesn't he? A. I suppose what he has.

Q. Well, he certainly does not haul what he has not got; I presume he has some and hauls it; you know that every farmer that is worthy of the name tries to haul out the manure he has on his farm? A. Yes sir.

Q. Well, if your statement is true why do the farmers do it? A. Because until I developed this method they didn't have it.

Q. Has anybody else around the lake, has anybody else living and owning land around that lake attempted to use this muck the way you are doing? A. Tom Quistberg who has testified here, bought a pump for that purpose, to pump the muck out of his spring, but as he didn't stay on the farm I don't think he did it.

Q. Did anybody owning land around that lake attempt to do this with the muck, what you are doing? A. Not to the present time.

Q. And you have been at this thing since 1908? A. In an experimental way.

Q. That is ten years? A. Yes.

Q. Now, when you speak of the cost of bringing that stuff out of the lake the way you do, you have got the first investment, whatever it is, for your engine and equipment, haven't you? A. Yes.

Q. Yes. Second, you have got the investment for your kerosine oil; I am not asking what it is; that is an item of expense? A. That is running expense.

Q. Then you need some lubricating oil, I suppose? A. Yes.

Q. And then it requires the labor of one man at least at intervals to look after that engine and equip-

ment? A. Yes sir.

Q. Then you have got to have this fellow in the boat and the rake to stir this up for you at times? A. Well, I have been operating the entire outfit myself, doing the work in the boat, and at times going ashore looking after the ditches.

Q. Well, it would require at least the continuous labor of one man in this entire operation? A. Yes.

Q. Well now, have you ever figured out in dollars and cents how much it cost you for your irrigation and fertilizer per acre, or anything of that kind, per season? A. Well the cost is not large; the cost is very small.

Q. You have got to make some allowance for repairs and wear and tear of machinery? A. There being but one running part on the pump, the wear and tear of machinery is exceedingly small.

Q. I thought you had either worn out or used four pumps in this ten year period. A. I have not worn out four pumps; I have used them experimentally, pumps of different makes and different sizes.

Q. Always wear and tear on your engine, isn't there? A. Certainly.

Q. Well, the fact is you cannot give us in dollars and cents how much it costs you per acre per season to fertilize and irrigate that land, can you? A. The cost per acre would be more difficult than the cost per hour or day, because seasons vary.

Q. Yes, that is true; well, give us the cost per day? A. I would say that at ten cent kerosine,—I have bought it nine and a half or ten,—at ten cent kerosine I think a dollar would cover the cost of kerosine and lubricating oils.

Q. Well, what is a man's labor worth by the day? A. I have had no repairs that I can think of on the spur of the moment on this last outfit for two seasons.

Q. What is a man's labor worth by the day? A. Under present conditions, conditions of 1917, I should say perhaps two dollars and a half, the same as any other farm work.

Q. Then there would be three dollars and a half without counting the wear and tear of machinery or equipment? A. You can allow that.

Q. Yes, or without saying anything about interest on the money you invested in the original cost of the equipment; ain't that true? A. Yes, I think so.

Q. Now, those potatoes you were talking about; you got naturally a light gravel soil there on your

farm, haven't you? A. I have a sample, referring to sample, Sandvig's Exhibit 3.

Q. That is from your meadow; I am talking about your land. A. It is light, sandy soil.

Q. Some gravel? A. Gravel underneath.

Q. Gravelly subsoil? A. Gravelly subsoil.

Q. Yes; and these potatoes, in 19 hills of potatoes you raised only six pounds; those pounds were without any fertilizer or manure of any kind? A. It was on clover sod, well top-dressed with manure.

Q. You are sure you didn't take that in some little gravel knoll? A. Well, I was very busy, and I told my wife to dig them impartially and take them just as they came, and I think she did.

Q. The other one, you gave it a good flat coat of muck and kept off all water? A. I gave the whole piece a coat of muck solution after I started it, because that is very quickly done.

Q. Do you know what kind of a potato crop there was in that community there last year? A. I think it was a small crop.

Q. Don't you know that the 1917 potato crop was a good crop? A. On decent heavy soil it is.

Q. Some of it is good soil? A. I wouldn't call the light gravel soil good decent heavy soil.

Q. Don't you know that down around that section of the country where Mr. Hendrickson lives and here around the south and east of Crow Lake, there was a good potato crop last year? A. Hendrickson, Erickson and John Quistberg lives on comparatively lower soil, not so high above the subterranean water, and I believe considerable soil.

Q. Well, there was a good potato crop around there? A. I would assume that he would have a much better crop than we would.

Q. Probably a good deal better farmers than you are; that is another reason, isn't it? A. Well, that is a personal question.

Q. The fact is you are, to say, meandering around with this stuff and experimenting to raise anything? A. No.

Q. Isn't it a fact that your fruit trees all look as though they were sunscalded and required attention, and they look as if they were not thrifty; isn't that true? A. I am sure I have the thriftiest orchard on that gravel soil, but there may be a few apple trees that have died for the same reasons fruit trees in Minnesota will die under the best of conditions.

Q. I guess there isn't any question about that,

they will die. Do you keep any stock on that farm?

A. Yes sir.

Q. How much? A. I have now four cows, and four calves, between yearlings and calves.

Q. Have you any other well on that farm except the one you say you have in the basement? A. I had one dug at a point from which I have later removed my barn, it has not been used for three or four years.

Q. Well, you can get water from that comparatively easy by driving a well reasonably deep, can't you? A. Well, it is not considered difficult to get water there, but it would require,—it would be difficult to re-dig my well in the basement.

Q. I think you said you are afraid if this lake is drained it will dry out your well that is in the basement; is that right? A. Undoubtedly.

Q. You think you have spring water there, don't you? A. Well, the water,—spring water,—the whole territory with exceptions here and there is gravel and the water seeks its level in the gravel, but not in the same way as in the lakes; there will be a fall along the drainage systems in the gravel, whereas in a lake of course the lake seeks absolutely its own level.

Q. You think the effect of this ditch will be different on your well from what it is on the spring up at Wiebe's, do you? A. Well, that is a point. Well, I think that the water in that gravel is under the same conditions. That is my opinion.

Q. What is that last? A. It is my opinion the water in that gravel is found under the same conditions, in the two places indicated.

Q. And the result would be the same in each case? A. That is my opinion.

Q. How far is your well from the lake? A. I should say about thirty rods.

Q. Do you think the distance would have any particular,—make any particular difference thirty rods away, and a spring right on the shore of the lake? A. Let me get that question definitely.

Q. I say do you think it would probably make any difference, the effect of this ditch on a spring that is right at the shore of the lake like Wiebe's and a spring, if there is one, up there at your house from which your well derives its water supply? A. Well, I believe that the water would be affected in the same way, making allowances for the difference of a few rods which perhaps would not be very great.

Q. I believe that is all. A. I would like to add to my testimony that in the dry season of 1910 I scraped some of this muck from along the lake-shore, some of which was dumped in my raspberry patch and cultivated in and some dumped in scraper fulls on idle land. 1910 was perhaps the driest season that has ever been known, was to my knowledge. The winter of 1910-11 had practically no snow. The spring of 1911 had little or no rain. This muck was left as it was dumped out of the scrapers. It dried and crumbled on top, looked like an ash pile in fact. In showing to a visitor in the latter part of June these muck piles I kicked off the dry crumbled surface, took out a handful of muck and squeezed the water out of it.

Q. Is that all, Mr. Sandvig? A. I think that is all.

Q. Just one more question. Suppose as Mr. Chute claims and Mr. Lahr claims, the effect of this ditch is to have this settle down so that it will be dry enough you can plant crops on: wouldn't this muck on this added land you are getting be an ideal place for vegetables and say currant bushes? A. Let me get your question.

Q. Assuming that this lake bed will settle down and dry out so that that muck is left there, as was done in Sand Lake as described here by Mr. Lahr and Mr. Chute,—you heard that testimony? A. Yes sir.

Q. Assuming that that would do that: wouldn't it be an ideal place to raise vegetables and things you raise in your garden, right there on this muck of the added land? A. I couldn't offer any conclusive conclusions from my experiments.

Q. Never mind your experiments; assume what these men say; don't you think it would be an ideal place for a garden? A. Assuming that it becomes dry muck, I cannot say that that muck in itself, without having sand added to it, would make a good soil. It is a rich fertilizer added to our gravel soil.

Q. You think it would be too rich? A. Well, it is not altogether a question of too rich. We want bread and butter, not butter alone.

Q. Did you ever raise any celery? A. No, I have not.

Q. Did you ever see it raised? A. Yes.

Q. Do you think that ground would be too rich for celery? A. You mean the muck bed?

Q. Yes sir. A. I think so; celery is raised in drained peat land; I don't know of any instance

where lake muck has been used successfully for celery, not to my knowledge.

Q. Isn't peat, the ordinary term for peat, isn't that decayed vegetation, dried out? A. Well, the peat and the lake muck may be different.

Q. Well, they may be, but they are both vegetable, decomposed, dried out matter, ain't they? A. The muck is more completely.

Q. Is more what? A. More completely decayed vegetation; what I would call peat is a root system of small roots in the process of decay.

Q. Well this stuff here is rich in plant life; you say it makes a good fertilizer? A. It makes a good fertilizer.

Q. Oh, I believe that is all. That's all as far as I am concerned.

SAMUEL S. CHUTE, a witness on the part of the Petitioners, was then recalled, for the purpose of cross examination, and testified as follows:

Examination conducted by Mr. C. R. Sandvig:

Q. It was brought out in your testimony, that as far as all exhibits yesterday, that it was proposed to start dredging at a point in the east end of the lake, was it not? A. Yes sir.

Q. And drain out the water before dredging the remainder of the lake? A. Yes sir.

Q. It was also brought out that in figuring the estimated cost of the ditch you had figured, included the excavating of the atmosphere that would be left between the settled muck and the lake level before it was,— before the water was let out? A. Yes sir.

Q. Do you consider that an evidence of capability in an engineer? A. I do not. I consider that an evidence of carelessness.

Q. You told us you have been an engineer for 28 years? A. I said I had been an engineer for 33 years.

Q. Thirty-three years. A. Old enough to know better.

Q. Would it be possible for an engineer with thirty-three years' experience to overlook such an error as that? A. Oh yes, possible, anything is possible in that line.

Q. You expected or intended that these farmers who object to the whole proposition should have to pay for excavating that air? A. No sir, I did not.

Q. Is it not a fact? A. I first filed no plans for the excavation of that lake, but specified that the contract should be let in 1920. Since then my men have prepared that Exhibit 2, and since the mistake

was discovered they have prepared it under my direction and corrected it.

Q. Is it not a fact that in allowing for excavating air you had a secret understanding that the contractors would refund that money and that it would be divided in some way? A. Not that I know. I have not had much experience in excavating air anyway. The contractors are not paid for those estimates. The estimates are stated in the specifications as only approximate, and they are paid for actual measurement for what they excavate.

Q. That is all. (No answer.)

Mr. Sullivan: That's all, Mr Chute.

Mr. Sandvig: As stated to your Honor at the intermission this is not an easy strain, and by reason of the fact that my testimony was not finished before noon I am not prepared to sum up, and in fact I am willing if necessary all the other work be finished before I sum up with arguments.

The Court: All right. I presume you will make your argument when final arguments are made.

Thereupon, a recess at 3:30 P. M. was declared.

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THE "FARMER" GOES AFTER SCIENTIFIC EVIDENCE—THE ORIGIN OF MUCK.

Page 27 of Transcript:

Mr. C. R. Sandvig examining F. G. Bradley, ass't. engineer:—

Q. As to the character of the muck have you had any sample of it tested by any soil expert? A. No I have not.

Q. How did that muck come to be there? A. Decayed vegetable matter.

Q. Where did the vegetable matter come from? A. From the leaves and sediment and rushes and soil decay, in there, from being water soaked.

Q. Is it possible to draw any vegetable food from the water and air with the vegetable growing in the lake? The wild rice, would it draw any plant food from the water and air? A. Yes, that is probably what the rushes and that stuff live on.

Q. They draw plant food from the water and the air and decomposing deposits decayed vegetation? A. It does.

WHAT CONSTITUTES "SUFFICIENT DEPTH AND VOLUME" FOR "BOATING" AND "FISHING" OF A "SUBSTANTIAL" CHARACTER—WHEN A MAN, BROAD AS HE IS LONG, AND WEIGHING ABOUT 215 LBS. IS IN THE HABIT OF FALLING OVER BOARD?

Page 97 of Transcript:—

Mr. C. R. Sandvig examining Mr. Thomas Quistberg:

Q. You have a boat at your home, have you not?
A. Yes sir.

Q. You keep it at your home in Belgrade where you live? A. Yes sir.

Q. You have a trailer on which you put that boat, a two wheel cart on which you put the boat? A. Yes.

Q. And you have an automobile? A. Yes; have now.

Q. And you go fishing sometimes? A. Yes.

Q. When you put the boat on this trailer hitched up behind the automobile it is just about as convenient for you to go to any lake regardless of distance? A. Yes, within a reasonable distance.

Q. You go fishing with your father sometimes? A. Yes.

Q. When you have been fishing with your father did your father ever fall over board? Yes.

Q. He has fallen out more than once? A. Yes.

Q. Quite a job getting him back in the boat again, is it not; it is a difficult job to get him back in the boat again after he falls out? A. Yes.

Q. How heavy a man is your father? A. About 215 lbs., something like that.

Q. How heavy are you? A. About 175-80 pounds.

Q. That's all. (No answer.)

THE "FARMER" ACTS AS ATTORNEY FOR A POOR NEIGHBOR.

The Court: Mr. Sandvig, are you ready to go on with the Kalland matter?

Mr. Sandvig: I think so, your Honor.

Thereupon the court read the written objections filed by Henry Kalland in this proceeding.

Mr. Sullivan: Has Mr. Sandvig any interest in this land, or does he appear as attorney?

The Court: As attorney, he signs himself.

Mr. Sullivan: So far as I am concerned, I am will-

ing to waive all claims, if the State of Minnesota will waive all claims.

The Court: This is Henry Kalland's case. There is a strip four rods wide along the south line of the NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 30, Township 123, Range 34.

Mr. Sullivan: What town is that?

Mr. Sandvig: Crow River.

The Court: All right. Have you any witnesses?

Mr. Sandvig: Why, this is,—I suppose I ought to be qualified to testify in regard to this, in view of the fact that I was raised on the farm of which this is a part.

The Court: All right, take the stand. Want him to testify by question and answer?

Mr. Sullivan: No, let him go on and say what he wants to; we will get it more quickly, and if there is anything I think is incompetent I will move to strike it out.

The Court: Go ahead.

Mr. Sandvig: The objections have been read in part, so far as I thought of them at that time. The ditch will cut off a portion of this poor man's land and disfigure his home.

Mr. Sullivan: And what?

Mr. Sandvig: Disfigure his home, the lot that is his home. The ditch will also lower the water out of his well, and under the condition in that gravelly country we have a very good strata of pure drinking water on the surface. Underneath this is bad water. Just how bad, or how badly this might affect his life and health is an open question. The lot also contains a little natural timber about his home, and the lowering of the water under that gravelly soil would cause these trees to dry up, and this would disfigure the attractions of his home. The strip also contains a small amount of slough land, and this is sufficiently drained in my judgment and more drainage would drain it too much. My father was the first settler in the southwestern part of Stearns county and the first man to turn a shovel in drainage. I have watched his work and tried to profit by it, and the drainage of those peat soils has been disappointing. I have tried to investigate the matter and get the opinions of authorities and profit by the experiments of other neighbors, and altogether it seems to be the same; the peat soils are not as valuable as a soil.

Mr. Sullivan: Just a moment; may I interrupt Mr. Sandvig? Is this land of Kalland's peat land?

Mr. Sandvig: Well, the portion of the land I re-

ferred to as slough would have some of this peat on it.

Mr. Sullivan: Well, go ahead.

Mr. Sandvig: This peat land or slough land, whichever you would call it, seems lacking in some way as a complete soil. In its natural condition it is true that sometimes it is flooded so that you can't get use of it in the early part of the summer, but usually you can get the hay at some time of the year; but when thoroughly drained it has been disappointing in different ways. Thoroughly drained in dry years it seems to dry out like a dry sponge. Capillary attraction does not seem to be effective for some reason in this peat soil to the same extent it is in our gravelly soil, perhaps for the reason that it is underlaid with an impervious layer of blue clay, or other physical reasons. In wet years this peat soil when thoroughly drained as far as ditches are concerned will still be bad in the same way, as a sponge lying under a dripping faucet, and in wet years it is cold and raw and soft. So peat lands have been disappointing when thoroughly drained. This land of Mr. Kalland's as it is, is in my opinion drained just to about the best point. More drainage would make it of less value. Even if the waters stood somewhat higher in that gravel, to have it a little higher, I think it might rather improve this particular strip because it is a strip along the timber, and it seems that this poor man has been overlooked entirely.

The Court: In what way do you mean?

Mr. Sandvig: His name does not seem to be on the viewers' reports and it is not carried out on the maps, and there is an indication in this that there is an intentional injustice made by the engineers and viewers because they positively or probably believed that this poor man would not be able to hire a lawyer to represent his case.

Mr. Sullivan: Now, if the Court please, I move that be stricken out as to assumptions and opinions of that kind that the viewers thought this man was poor and couldn't hire a lawyer, and I ask the Court to direct Mr. Sandvig to confine himself to testimony and not criticizing the viewers and engineers.

The Court: Yes; of course that will be a matter of argument, Mr. Sandvig.

Mr. Sandvig: Well, I will call Mr. Lahr.

Cross Examination.

By Mr. Sullivan:

Q. Well now, you wait a minute until I cross ex-

amine you. This strip Mr. Kalland has a four rod strip? A. Yes sir.

Q. Does he own any land north of that on that forty? A. No, he doesn't own any land north, but he owns some land south.

Q. What land does he own? A. The road kitter-corners through his land and cuts off a little corner of what was formerly Oscar Johnson's land, leaving it on the same side of the road as his strip, and he has bought that little corner.

Q. How much does that little corner amount to? A. Constitutes 3-16 of an acre.

Q. 3-16 of an acre? A. That is outside the four rod strip.

Q. Does this ditch as staked out take up this four rod strip? A. The plat is evidently wrong.

Q. Have you been on the ground? A. Yes sir.

Q. Did you see the stake line? A. Yes sir.

Q. Where does the stake line run with reference to this four rod strip? A. The stakes would enter—according to the stake line it would take his southwest corner and practically the whole strip at that end, and then it runs out to the north.

Q. Well, how much ground would it take there from this man in running the ditch where it is staked? A. I have not surveyed; that is what the engineer should have done.

Q. Well, can you tell me approximately what it will take according to the stake line? A. I cannot.

Q. For what distance does it run and what width is taken there, and perhaps we can figure? A. It runs a little north of east, but I couldn't say just at what angle.

Q. Is the full width of this ditch according to the stake line taken at any place wholly from Kalland's land? A. I think it would be.

Q. Where? A. Where it enters his land on the west end of it.

Q. And how far does the full width continue on that four rod strip? A. Well, the ditch bears to the north I think, at once.

Q. Runs immediately off of it, doesn't it? A. Well, not so immediately.

Q. Well, how many feet? A. I can't give you the angle, but I think it is turning off right at the west edge of his land.

Q. The ditch turns right at the west corner of his land? A. It bears to the north.

Q. Well, then it is a very trifling that that ditch takes from him in the way of actual amount of land?

A. Well, if it would be a big rich man I should say yes.

Q. You don't seem to be willing to talk. How much does it take? A. I am not willing because I don't know. That is what the engineers should have stated.

Q. Do you know whether it touches his strip at all? A. I certainly do.

Q. Well can't you tell us how far, if you certainly know. A. Well, I know where it enters the land and I know where it bears to the north a little.

Q. Immediately? A. Well, it bears to the north immediately, but how much or what angle I can't give.

Q. Well, if this takes anything for ditch purposes it is a very, very small part, and you know it; ain't that right? A. Well, I would say if it was a big rich man's land it would be a very small amount.

Q. I am not asking whether it is a big rich man's land, but you know at this time how much was taken? A. No sir, I don't know the area.

Q. Well, if you don't, how can you compare it to a rich man or a poor man? A. Well, a little piece of land looks big to a poor man.

Q. The trouble is you can't tell us whether it takes any. A. Yes sir, I can.

Q. How much does it take? A. I can't tell.

The Court: How many acres has Mr. Kalland altogether?

Mr. Sandvig: Well, both this four rod strip and the little corner wouldn't amount to quite two acres.

The Court: Does he also have the corner southwest of the road?

Mr. Sandvig: Yes sir.

Q. 3-16 of an acre. A. Yes, that is what his deed calls for; that is besides the four rod strip.

The Court: And what is that land worth in its present condition?

Mr. Sandvig: Well, as a matter of fact, Mr. Kalland don't want the ditch.

The Court: Well, I am asking you how much that land is worth.

Mr. Sandvig: That would be a very difficult question to answer for another man, in view of the fact that it is only two acres which constitutes a part of his home.

Mr. Sullivan: Well, the Court was inquiring about the 3-16 of an acre.

The Court: No, the entire four rod strip.

Mr. Sandvig: Yes sir.

The Court: Don't you know the land?

Mr. Sandvig: Yes sir.

The Court: Don't you know the value of lands in that township?

Mr. Sandvig: Take off the buildings, and restored to Linderholm's farm, I should say it would be worth perhaps in the neighborhood of one hundred dollars an acre.

The Court: I am asking what that land that Kalland owns.

Mr. Sandvig: As a home lot it would necessarily be worth very much more because of the fact that his improvements are on it.

The Court: Very well; let us have it.

Mr. Sandvig: Well, as a home lot, two acres constituting a home lot; if that land is a portion of a big farm, is worth—

The Court: No, that is not it; that land as it is, belonging to Kalland, how much is it worth, if you know?

Mr. Sandvig: Well, I should say three hundred dollars an acre.

The Court: Very well. Three hundred dollars an acre.

Mr. Sullivan: Well, does your Honor think the ditch don't follow the strip?

The Court: According to the plan it enters on that strip.

Mr. Sullivan: Yes, at one corner, and then angles almost immediately.

The Court: Well, the way the drawing is, the ditch has a station right in his center; I don't know how accurate this is.

Mr. Sullivan: As I understand, it does not follow the strip; it angles off to the north.

The Court: Have you seen the stake line on that land?

Mr. Sandvig: Yes sir.

The Court: Will you take a piece of paper and draw Mr. Kalland's land, and also put on the stake line.

Mr. Sandvig: Well, if you have a plat I think I can show you.

The Court: Well, if you will draw one, we will take that as your testimony.

The witness, Mr. Sandvig, then made a diagram on a piece of paper.

The Court: Call it Kalland's Exhibit 1. Any objection to its reception?

Mr. Sullivan: No.

The Court: Received.

Mr. Sullivan: I understand this is the four rod strip and this is where the ditch comes in and angles to the north and leaves it up on Linderholm's land.

The Court: Now, what part of the four acres has he his buildings on?

Mr. Sullivan: Two acres, your Honor.

Mr. Sandvig: Two acres.

The Court: I mean the four rods. Will you designate them on that strip?

Witness indicates on the exhibit.

The Court: Near the road, all right; square near the road, I will mark it "A", designates the buildings; and what are those buildings?

Mr. Sandvig: It is a frame house, and I think a little stable.

The Court: And what use does he make of this strip?

Mr. Sandvig: Well, it is used primarily for building lot and pasture.

The Court: Pasture; does he use the entire strip for pasture?

Mr. Sandvig: I think so.

The Court: Has it fenced?

Mr. Sandvig: Yes, I believe it is; my recollection, this fenced with netting.

The Court: Are you related to him?

Mr. Sandvig: No sir.

The Court: You say you have a power of attorney from him to represent him?

Mr. Sandvig: Yes sir.

The Court: Is that power of attorney in writing?

Mr. Sandvig: Yes sir.

The Court: Will you kindly hand it to the Reporter, and have him mark it.

Document produced by the witness, handed to the Reporter, and then marked for identification, Kaland's Exhibit 2.

The Court: Any objection to the receipt of this power?

Mr. Sullivan: No objection.

The Court: You can make a copy, Mr. Reporter, and give the original back to Mr. Sandvig, and let the copy stand in place of the original.

Q. Now, on this plat of yours, Mr. Sandvig, Kaland's Exhibit 1, where that ditch according to your outline crosses diagonally the corner of that four rod strip, that is slough land right there, ain't it? A. Yes, I should say in that particular point or about probably five or six rods east on the south line of

that point, I think the line is just about on the edge of the timber.

Q. Well, don't you think that ditch is in fact a benefit to that little slough corner? A. No, for reasons I have given I do not think it is.

Q. Well, you haven't any other reasons to give except those you have already given have you? A. Well, my proportions there are not correct; a ditch 17 feet deep would cut up the entire four rods as far as it goes through.

Q. It couldn't cut up the entire four rods if it only runs across that corner, could it; how do you figure that out? A. Well, the ditch there would be about 16 feet deep, would it not; 15 feet?

Q. I don't know. A. Well, perhaps 14 feet deep, and if it runs on a level from the lake it would perhaps be 14 feet deep, and you allow for the width of the ditch at the surface and the banks, I don't think you would have very much left of that four rods.

Q. Does the slough on that Kalland land run back to the road that is in front of the house? A. The slough there is square with the lines; as I said, the line would run into the timber south, would run into the timber I think, about five or six rods, perhaps, from the west end. The timber is in the form of a point there, but from there on why the line would cut into the timber slightly varying depths, all along the whole distance.

Q. Well, where the public road crosses across Kalland's four rod strip there, is that timber or slough, or what kind of land is that? A. At the point where the road crosses the highway it is equally divided, with perhaps slightly more timber.

Q. Well, is it slough or high land? A. Well, the north edge would be slough, and the south portion would be high land.

Q. And how far from the road is the house and buildings? A. Well, the house would only be a distance of a few rods, perhaps six or seven rods or such a matter.

Q. Is the house east or west of the road, or north or south, or how is it located with reference to the road? A. Well, the house would be northeast of the road; it would be east of the road at one point and north of the road at another point, the road turning there.

Q. What kind of a well has Kalland got now on his land? A. Open well; I have not seen his well.

Q. Do you know how deep it is? A. I don't

know as a fact, but I should judge not very deep, perhaps eight or ten feet.

Q. Your idea is if this ditch is cut through there it is going to destroy the well, is that it? A. Yes.

Q. Dry the water all away? A. Well, it will lower the water.

Q. Well, that depends on how that well is fed, whether from springs in the earth or from the slough, isn't it? A. Well, there is no question on that point, with gravelly soil, the water in that gravelly soil is very much the same as a lake.

Q. Well, how do you know that well ain't fed by springs that the ditch wouldn't have any effect on perhaps? A. Well, what is called a feed spring is a water-bearing stratum of sand lying in impervious clay loam.

Q. You don't know whether I mean that or not. I mean in the usual expectation of a spring when a man digs a well and water gushes in sufficient quantity to make it not a hole in the ground but a well; do you know anything about that well at all; did you help dig it? A. No, I did not.

Q. And you don't know what its source of water is except as you speculate on it? A. I don't speculate on it in that country. I know that country; I know the gravel and the subsoil and what will happen.

Q. You have never had any experience with the effect of a ditch on such a situation as this, have you. A. Well, my father has been ditching there for the last 50 or 60 years.

Q. Did he ever create such a situation as this is? A. Yes, most certainly, our wells have been dropping down, with the drainage for years and every time the ditches have been dug the wells have dropped.

Q. Haven't they dropped according to tillage and cultivation? A. Not according to tillage and cultivation, but according to drainage.

Q. And isn't it true where there wasn't any drainage the wells and creeks have become comparatively in the last fifty years with less water in them? A. I have traveled extensively over this State and in other countries, and I have never found a single place where the water has lowered except where it may be accounted for by the drainage.

Q. Well, that's all. (No answer.)

The Court: Anything further, Mr. Sandvig?

Mr. Sandvig: That is all I wish to say. I will call Mr. Lahr.

THE "FARMER" BRINGS OUT DAMAGING ADMISSIONS AND THE GANG OF CONSPIRATORS IS IMPLICATED WITH "OTHER INTERESTS" THAN AGRICULTURAL INTERESTS.

P. N. LAHR, a witness on the part of the Petitioners, was then called for the purpose of cross examination, and testified as follows:

Examination conducted by Mr. C. R. Sandvig:

Q. Mr. Lahr, you are a retired farmer? A. Yes sir.

Q. How many years did you farm? A. Pretty near all my life.

Q. You know something about the way farms are laid out? A. A little something.

Q. When you drive up to a place you can pretty near tell by the arrangement of fences and buildings just about how much land belongs to a certain set of buildings, can you not? A. To a certain set of buildings, I think I can, that is within the enclosure of that fence.

Q. Now in fulfilling your duties as viewer in following the line of the ditch from the lake you came to a place where buildings and fences indicated that the ditch was crossing property not indicated on the maps, did you not? A. Not indicated on the map?

Q. Yes. A. I wouldn't say it.

Q. But refer to Exhibit. A. I wouldn't say as to that not indicated on the map.

Mr. Sullivan: You followed the stake line, didn't you?

The Witness: Why yes.

Q. You followed the stake line and at this point here, you remember there was a fence here and buildings inside of that fence, and that that evidently was not part of the Linderholm farm at that time? A. I don't know as to the names of the farmers. Yes, I noticed there was a fence there somewhere.

Q. And you noticed there was buildings inside that fence? A. Close to the fence.

Q. Well, you noticed that was a separate property that was not accounted for in the reports of the engineer? A. You mean on the north of that fence?

Q. Well, it would be on the south. A. What I am referring to is this fence right where that ditch goes.

Q. You remember where that ditch crosses the road, do you not? A. Yes sir.

Q. And at a point slightly south, west of where

the ditch crosses the road, the ditch cut off the corner of the property there, about four rods wide.

The Court: NW NW, 30, Crow Lake?

Q. This would be Crow River town. A. The NW of the NW, Town of Crow River, Section 30?

The Court: Yes.

The Witness: If I am not mistaken, there is a fence on that line.

Q. Did you notice there was buildings there? A. On the north side of that fence?

Q. No, it would be on the south side of the fence. A. South side of the 1-16 line, or which?

Q. The buildings would be immediately,—well, in the timber there southeast, south on the east side of the road south of that bridge. A. Yes, near the road running south from Belgrade.

Q. Well, this is not the Belgrade road; this is a road that used to be, Belgrade. A. There is a road further east, running south from Belgrade.

Q. Yes. A. Near that road.

Q. No, this is the old road, the road running further west. A. Yes, I understand; I think I do.

Q. You didn't make any report of that property at all, did you? A. Well, I fail to find it here, yes.

Q. Let's see what notes you have on that. A. Well, these are my own individual notes.

Q. Did you have notes there at all on this property? A. Well no.

Q. You know very well, you don't; well, why don't you think it is your duty as a viewer to take notes on every property affected by the ditch, isn't it? A. I don't know as it is.

Q. Well, you noticed property then? A. Well, we saw land there, yes.

Q. You saw the ditch was cutting through and damaging it? A. We followed the stake line, and if I am not mistaken it just touches the corner a little; I wouldn't say this positive.

Q. It cuts off a little; you didn't think a poor man would hire a lawyer and fight? A. We didn't know who the man was, whether he was rich or poor; we didn't inquire whether rich man or poor man living there, and we didn't inquire the names there; that didn't cut any figure with us.

Q. Lots of the things that you did do that is your duty to do? A. Well, I presume we done our duty.

Mr. Sullivan: As I understand, you took that as a part of that forty?

The Witness: Yes, that is the way it was taken.

The Court: No, this is the way they returned it:

NW $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 30 (Crow River town) less the east 48 rods of the south four rods, and less the west 24 $\frac{1}{2}$ rods of the south 48 rods which they returned.

The Witness: Well, then we did return it.

The Court: But you left out the four rods?

The Witness: Well, I wouldn't say that; I haven't got any notes to that effect here. There is quite a lot of property around in that locality, which is cut up.

Mr. Sullivan: I presume the state of the record as to this tract is that there isn't any assessment from the viewers with reference to it?

The Witness: No.

Q. Nor any damages?

The Court: And he has appeared by attorney.

Mr. Sullivan: He has appeared and submitted to the jurisdiction of the Court, but I would go ahead and take the testimony and make the assessment one way or the other.

The Witness: I would say then that it was merely property omitted; an oversight.

The Court: Well, what do you think about it? Here is Kalland's Exhibit 1. Assuming that drawing to be correct, you think that land will be adversely affected? You think the ditch would damage that land, cutting off that corner.

The Witness: I can't exactly recall that I was on that place, but I have no notes of it.

Q. Is it not a fact that you did not care for the interests of Mr. Kalland or anybody else effected by this ditch? A. No sir, that is not a fact.

Q. Is it not a fact that you had "other interests" in mind in making your report of this ditch? A. No sir, we had the ditch in our mind and assessments of land.

Q. The ditch would in some way affect "other interests" than farmers?

Mr. Sullivan: Now, did you hear his question: that the ditch would affect "other interests" besides farmers?

The Witness: With the viewers?

Mr. Sullivan: Yes, that is what he wants to know.

The Witness: I don't know how he wants his question answered.

Mr. Sullivan: I don't know whether you understand the question.

The Witness: We had other interests in mind?

Mr. Sullivan: That you had some other people not farmers interested in this ditch at all, that went

to you as viewers and improperly influenced you.

The Witness: No sir, no sir. Nothing of the kind. Nothing of the kind. If that is the way he puts the question, nothing of the kind. I wouldn't want to be a viewer, if that was used on me I would resign.

Q. You know Mr. Borgerding, in Belgrade? A. Yes sir.

Q. And you smoke a cigar with him? A. Yes sir, I smoked with him.

Q. And in fact you don't know how many cigars you did smoke? A. No sir. Whenever I meet him we smoke a cigar.

Q. And you talked this ditch over with him? A. We talk ditch, yes sir.

Q. And Mr. Borgerding was pretty much interested? A. About ditching, in a general way.

Q. Mr Borgerding was pretty much interested in this? A. Well, I don't know how deeply he was interested, but he knew we were viewers and when we stopped at the hotel he came in and asked us how we were getting along. In fact I have stopped there before, being on the County Board committee, and every evening I stopped there I noticed he would come and buy a cigar or two and put them in his pocket.

Q. And when he knew you were a viewer he put a cigar in your hands instead of putting them both in his pocket? A. Certainly. If you would offer me one I would smoke with you.

Q. Is there another man you came and talked with as much about this ditch while you were in that territory around Belgrade as Chris Borgerding? A. Well, as I say, Mr. Borgerding came there every night around that hotel, practically every night. I have been stopping off and on at that hotel for the last three years, I think about a dozen times before this, and every time I was there Mr. Borgerding came in in the evening, and came in and sat down and bought cigars and played cards, and while he was there he offered me a cigar and I took the cigar and smoked it, and if you had come in and given me a cigar you would have been recognized in the same way.

Q. Did the landlady of the hotel ever tell you that Mr. Sandvig wanted to see you at his place? A. I think she did.

Q. As a matter of fact you have said you did not know anything about this place. A. I don't know now.

Q. You say you are through that place, you said

you don't know whether there were buildings there or not?

Mr. Sullivan: Well, has this anything to do with the Kalland matter?

Mr. Sandvig: Yes it has an important bearing, what I am trying to bring out.

The Witness: I can say this to the Court, if they let you and me go together they won't do much of anything else today.

12 M. Noon recess. Afternoon session, 2 P. M.

Q. Mr. Lahr, you know that Mr. Borgerding is a banker, do you not? A. Yes sir.

Q. He has a good substantial bank? A. I should think so.

Q. As far as you know, he is reputed to be worth about a million dollars? A. Oh, I wouldn't say. I don't know that.

Q. You know bankers make money by loaning out other people's moneys that are deposited in the bank?

Mr. Sullivan: Just a moment. Mr. Borgerding is not here and is not represented, and I think I shall interpose an objection on behalf of the petitioners that this is incompetent, irrelevant, immaterial, inadmissible, and no allegation in the objections of Mr. Kalland of impropriety or improper methods on the part of the viewers. I think this is bordering almost on scandal.

The Court: The objection to this question is sustained.

Mr. Sandvig: Well, that is all, I guess.

Mr. Sullivan: That is all, Mr. Lahr.

C. R. SANDVIG then testifies as follows:

Referring to Objectors' Exhibit 28 and Objectors' Exhibit 27, we have a photograph of Mr. Kalland cutting ice. Mr. Kalland is a laboring man, and has to my knowledge had something to do with ice cutting,—either he has contracts for cutting ice, or taking ice for a number of years, I think off and on as long as he has lived there. And as Mr. Kalland is an objector to the drainage project, it is only fair to him that this be considered. The lake is a means of support to him to that extent, that it furnishes a job or contract in the winter time. I think that is all.

SAMUEL S. CHUTE, a witness on the part of the Petitioners, was then recalled, for further cross examination, and testified as follows:

Examination conducted by Mr. C. R. Sandvig:

Q. Mr. Chute, in the different exhibits I don't find Mr. Kalland's property. Why has that been

omitted? A. I don't know. Mr. Lang looked that up the other day. Did he give you a sketch of that, that you brought here?

Q. Yes, but they were brought in here this morning, or he made another one this morning, and I suppose he took that with him, or didn't he have any of these with him? A. I don't think he had any of these numbers; they are not on the tax list. It was not considered benefited property and they didn't put it on.

Q. And it was not awarded any damages, and it was not on the maps? A. I don't know; maybe his name was not on the tax lists. We took the descriptions from the tax lists, and took the names from the tax list.

Q. He is old enough to be on the tax list. A. Oh yes, he is old enough; there is lots of boys are not on the tax list. This may be on the tax list.

Q. Well, it is your duty to put everything there that is there, isn't it? It seems to me there is a lot — A. I don't know; you perhaps know what our duties are better than I do. We attempted to do our duties.

Q. You say you attempted; there has been considerable heresay about your qualifications and I wish you would clear them up. Is it not a fact that you are a confirmed and habitual drunkard? A. No sir.

Mr. Sullivan: Just a moment, I object to that as incompetent and an impertinent question.

Mr. Sandvig: I think it is an important question? There is so many mistakes in the work of the engineer, I think it ought to be explained; if he was intoxicated I think it ought to be brought out.

The Court: You haven't asked him that. The objection to the question is sustained.

Mr. Sandvig: Well, so many mistakes, and we don't know why. I suppose that will be all.

Mr. Sullivan: That's all Mr. Chute.

Mr. Sandvig: I think that will be all the evidence.

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